

The UniForum Professional Training Series

Presented by UniForum in Cooperation with EurOpen

Designing and Building Your Enterprise World Wide Web Server September 23-25, 1996

Instructors
David Kensiski
John Stewart



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The International Association of Open Systems Professionals

About the Instructors

David Kensiski

Dave is a senior system administrator for Cisco Systems, responsible primarily for the care and feeding of the myriad Web servers that make up Cisco Connection Online. When he's not busy patching a kernel here or restoring a RAID array there, he doubles as a part-time manager of the Web re-engineering project. Formerly he was the network design engineer for the State Government and University Systems division of MCI, where he designed and developed integrated systems solutions for MCI, including CampusMCI - a nationwide dial-up Internet service provider. David has taught numerous Web courses for UniForum as well as various industry conferences. He has served as a member of the program review committee for LISA X and the SANS Network Security Seminar.

John Stewart

John is the lead system administrator for the Customer Engineering Division at Cisco Systems, Inc. supporting a worldwide computing environment. John also devotes much of his time to the external World Wide Web development team in Advanced Customer Systems doing software development and security investigations. He has published technical papers in artificial intelligence and computer security, presented technical papers at Sun, World, Systems and Network Security (SANS) and UniForum conferences, and the USENIX Security Symposium. Prior to joining Cisco, John worked for the NAS (Numerical Aerodynamic Simulation) Facility at NASA Ames Research Center.

Designing and Building Your Enterprise World Wide Web Server

September 18-20, 1996
and
September 23-25, 1996

Instructors:
David Kensiski, Cisco Systems
John Stewart, Cisco Systems

Presented for Uniforum
Professional Training Series



UniForum™

Introduction & Clients and Servers

Designing & Building Your Enterprise WWW Server

Clients and Servers

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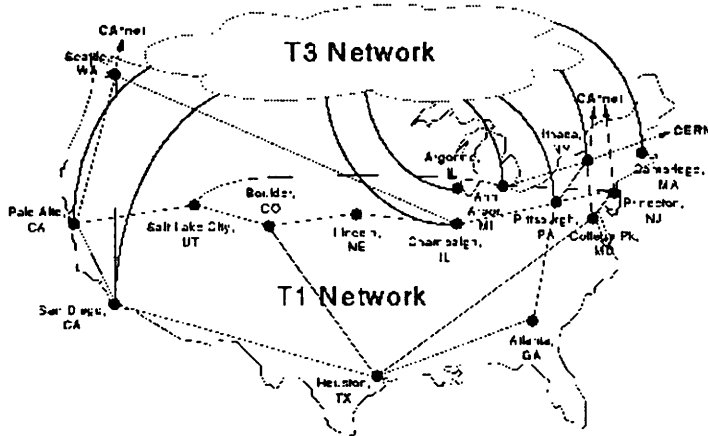
Schedule

- **Introduction**
- **Browser Software/machine**
- **Server Software/machine**
- **Information**
- **Responsibility**
- **Server maintenance**
- **Tips, Techniques, Servers, and Sites**
- **Late Breaking News**

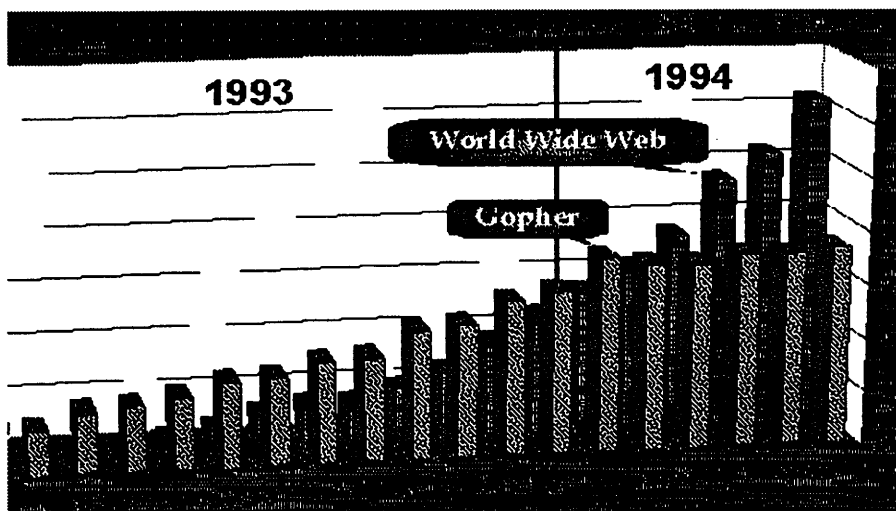
A way back when...

(I went uphill both ways...)

NSFNET T1/T3 Networks 7/91



A Pattern Forms...

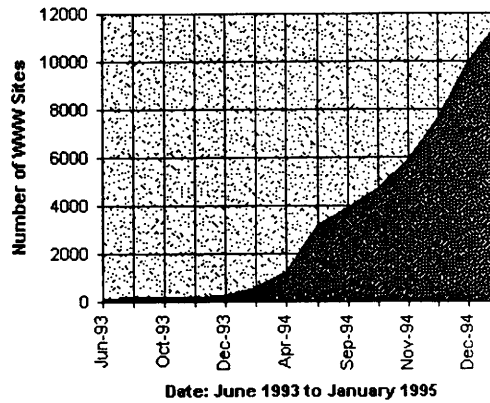


[<ftp://nis.nsf.net/statistics/nsfnet/1992-1994>]

Today...

- As of May 14th, 1996 there are 325,444 total domains registered at the internic 90,255 domains have web sites (58% of the total). (Internet Domain-Name Database, 1996) [<http://www.bitgroup.com>]
- Number of business listings of web sites in the Commercial Sites Index: 15,379 [<http://www.directory.net/dir/statistics.html>]
- Average number of sites added to the Commercial Sites Index, per day: 73 [<http://www.directory.net/dir/statistics.html>]

Growth in Number of WWW Servers
June 1993 to January 1995



Schedule

- Introduction ✓
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General Capabilities for a Browser

(so what can it *do*?)

- Present diverse information in a uniform manner
- Understand and follow references to other information (hyperlinks)
- Start supplemental programs based on information format
- Allow user customization for default fonts, image caching, colors, etc.
- Encrypt data before data is sent into "the maze"
- Grow with the times

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Nice Capabilities in a Browser

(I bought the car, what kind of stereo can I put in it?)

- Support for HTML 3.x tables
- Support for Frames
- Powerful printing capabilities
- Netscape HTML extensions
- Java/JavaScript capable
- Supports VRML
- Configurable for firewalls

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An Exhaustive List of Browsers

(faq.www)

- **Amiga** AMosaic, Emacs-W3, IBrowse, Amiga Lynx
- **MS-Windows** Cello, NCSA Mosaic, WinWeb, Netscape, Spry Mosaic, Booklink, SlipKnot, Spyglass, Quarterdeck Mosaic, Internet Explorer, Internetworks, I-COMM, NetShark, WebExplorer, WebSurfer, UdiWWW, Emissary
- **MS-DOS** DosLynx, Minuet
- **Macintosh** NCSA Mosaic, Netscape, MacWeb, Spyglass
- **NeXTStep** SpiderWoman, Netsurfer, OmniWeb, WorldWideWeb, Emacs-W3

An Exhaustive List of Browsers (cont.)

(faq.www)

- **X Windows** NCSA Mosaic, Netscape, Quadralay, tkWWW, MidasWWW, Viola, Chimera, Emacs-W3, Spyglass, MMM, Chimera, Arena
- **Unix ttymode** Lynx, Emacs-W3, Line Mode Browser, perlWWW
- **Batch Mode** Batch Mode Browser
- **Unix linemode** Line Mode Browser, Lynx, perlWWW, Emacs-W3
- **VMS** www_client, NCSA Mosaic (DecWindows)
- **VM/CMS** Albert, Charlotte
- **Windows '95** Netscape, Oracle PowerBrowser, AOL, Internet Explorer

Browser Comparison

	GUI	Basic Pass	S-HTTP	SSL	Proxy Aware	Java	Pop Up Alerts	Page Cache	Frames	News
Emacs W3	No	Yes	No	No	No	No	No	No	No	No
Lynx	No	Yes	No	No	No	No	No	No	No	No
Mosaic	Yes	Yes	No	No	Yes	No	Yes	No*	No	Yes
Netscape	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spyglass	Yes	Yes	Add-on	No	Yes	No	Yes	No	No	No
tkWWW	Yes	Yes	No	No	No	No	No	No	No	No
Power-Browser	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
MS Explorer	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes

* Mosaic supports image caching, not page caching.

Netscape v3.0

[<ftp://ftp.netscape.com/~ftp/netscape/>]

- Available for Windows, MacOS, OSF2, HPUX, IRIX5, AIX3.2, Solaris 1.x/2.x
- Pre-compiled binaries are available
- "Bookmarks" available for frequently visited sites
- Text "cache-ahead" feature provides hot HTML text before all images on the page are loaded.
- Configurable options include display scrollbars, location field, font size, local data caches, simultaneous network connections, maximum bandwidth used, and more...
- Print to file option available (postscript only)
- Fixed icon bar for commonly used menu choices
- Java and JavaScript capable
- Netscape plug-ins fully implemented; supports CoolTalk, VRML, etc.
- 128-bit RC4 key version available in the United States

Mosaic v2.7b5

[[ftp://ftp.ncsa.uiuc.edu/Web/Mosaic/\(Unix,Windows,Mac\)/binaries/](ftp://ftp.ncsa.uiuc.edu/Web/Mosaic/(Unix,Windows,Mac)/binaries/)]

- Available for Windows, MacOS, OSF2, HPUX, IRIX5, AIX3.2, Solaris 2.x, and SunOS 4.1.x
- "Hotlist" available for frequently visited sites
- Source code available/pre-compiled binaries are available
- Motif build environment required for a rebuild from source
- Print/Save as HTML, formatted text, plain text or postscript
- URL autoexpansion (type "shire" and you go to <http://shire>)
- Detachable menu bars

lynx v2-5

[<ftp://ftp2.cc.ukans.edu/pub/lynx/>]

- Available as a line mode browser for AIX3.2, OSF, SunOS 4.1.3, Linux
- Source code available/pre-compiled binaries are available
- Supports print to file, mail to user, and print to screen
- Supports uploaders and downloaders (zmodem, kermit, etc)
- ftp:, http:, gopher:, news: URL types supported
- supports lynxcgi: (local cgi executables)
- Originally designed to support a CWIS, now supports WWW

Supplemental Software

(I knew there was a catch...)

- Browsers don't have all the capabilities built in
- Allows for new types to be defined without requiring a new binary
- Each site may have different applications that do the same thing
- Standards are still under development

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Supplemental Software (cont.)

(a sample listing)

- **xv 3.10a** **Image viewer** [ftp://ftp.cis.upenn.edu/pub/xv/]
- **showaudio** **sound player** [ftp://thumper.bellcore.com/pub/nsb/]
 Part of mm2.7 release
- **mpeg_play 2.3** **mpeg movie player**
 [ftp://tr-ftp.cs.berkeley.edu/pub/multimedia/mpeg/]
- **xdvi-20** **DVI previewer** [ftp://export.lcs.mit.edu/contrib/]
- **metamail 2.7** **multimedia mime previewer**
 [ftp://thumper.bellcore.com/pub/nsb/]
- **ghostview 3.33** **PostScript previewer**
 [ftp://ftp.cs.wisc.edu/pub/ghost/]

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Supplemental Software Configuration

(I'm hooked...)

- **NCSA Mosaic**

```
/usr/local/lib/mosaic/mime.types
/usr/local/lib/mosaic/mailcap
~USER/.mime.types
~USER/.mailcap
```

- **Netscape in Unix**

```
/usr/local/lib/netscape/mime.types
/usr/local/lib/netscape/mailcap
~USER/.mime.types
~USER/.mailcap
```

- **WindowsNT/95 Browsers**

Under most options menus, you specify the type and the helper application.

mime.types

(This page is silent, and wears face makeup...)

application/x-csh	csh
application/octet-stream	bin
application/pdf	pdf
application/postscript	ai eps ps
application/x-dvi	dvi
application/x-frame	fm mif
audio/basic	au snd
audio/x-wav	wav
text/html	html
text/plain	txt
video/mpeg	mpeg mpg mpe
video/quicktime	qt mov
video/x-msvideo	avi
video/x-sgi-movie	movie

mailcap

(It's the hat a mailman wears...)

```
application/pdf;      acroread %s
application/x-csh;    csh -f %s
audio/*;              xplaygizmo -p -q showaudio %s
image/*;              xv %s
video/mpeg;           xplaygizmo -p mpeg_play %s
video/quicktime;     xplaygizmo -p xanim %s
application/x-frame;  fm_viewer %s
application/postscript; ghostview %s
```

Schedule

- Introduction ✓
- Browser software/machine ✓
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- Tips, Techniques, Servers, and Sites
- Late Breaking News

Why have a WWW server?

(WWW -> Why Write a Web)

- **Management says, "Make it so!"**
- **Centralizes information systems into one common interface**
- **Secure Transactions might soon make it possible to send purchasing information and credit card style transactions across the network.**
- **Unparalleled information tool for new users, new tools, or new products**
- **It's cool!**

Notes

WWW Server Design Considerations

Who is your Audience?

(generic)

- Internal personnel
- External customers
- Unknown

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WWW Server Design Considerations

What is your audience?

(What?..... exactly!)

- Audience Size
- Usage Model
- Needs
- Sustained interest

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WWW Server Design Considerations (cont.)

What content will the server provide?

(Whatever has that nice word "Classified" on it)

- Public information
- Company sensitive information
- Images
- Pointers to other places
- Feedback forms

The more you put in, the more work it is...

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Notes

- **NOTE:** If you point to "offsite," make sure to run a link checker to make sure that "other site" doesn't move the data out from underneath you. The user only sees that s/he got to your site, and that your link was broken.

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WWW Server Design Considerations (cont.)

How does the information come in and go out?

(through the server, of course!)

- Access methods
 - Web, BBS, ftp?
- Formats
 - HTML, PDF, PostScript, text
- Information maintenance

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Notes

- **NOTE: Keep the content current, keep the appearance fresh**
- **NOTE: Remember that some are connecting to the Internet via 9600bps modems (they don't receive large graphics very well)**

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WWW Server Host

(Kevin Hughes, Open Systems Today 6/6/94)

Activity	Requests per Day	Organization	Machine
Light	0 to 2,000	University department, Small company	Any system
Intermediate	2,000 to 5,000	Midsized company, small university	486PCs, Mac, Unix workstation
Mid-Heavy	10,000 to 20,000	Large company, major university	Pentium PCs, PowerMac, SPARCStation 10
Heavy	30,000 and up	Major providers	Higher-end servers, SPARCcenter 2000

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WWW Server Host (cont.)

- **WebSTONE** [<http://www.sgi.com/Products/WebFORCE/WebStone/>]
- **Network capacity and requirements**
 - Multi-homed?
 - FDDI vs CDDI vs Ether vs FastEther vs ATM vs dialup vs X.25 vs T-net
- **Data Storage**
 - Disk capacity, disk speed, RAID, SCSI
- **Redundancy**
 - Multiple CPU's, multiple chassis, multiple controller cards,
 - High Availability software

Notes

WWW Server Design Considerations

(technical)

- **HTTP server software**
- **Advanced access features**
- **Successful document organization**
- **Stable URL Structure**
- **Maintenance for your server**
- **Helpful tools**
- **Server responsibility**
- **Announcing your server**
- **Security**

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Notes

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General Capabilities for a Server

(serve, serve, serve)

- Provide a 'standardized' connection service for viewers
- Establish security controls for content access
- Log ad nauseum
- Grow with the times

Notes

An Exhaustive List of Servers

(faq.www)

- NCSA httpd Unix, Windows, Amiga
- EIT httpd Unix
- CERN httpd Unix, VMS
- Plexus perl server
- MacHTTP Macintosh
- HTTPS Windows NT
- SerWeb Windows
- OS2HTTPD OS/2
- Netscape Commerce/Communication
- PowerServer WinNT
- Apache Unix, WinNT
- Website WinNT, Win95

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Server Comparison

[<http://www.proper.com/www/servers-chart.html>]

	GUI Setup	Basic Pass	S-HTTP	SSL	Server Includes	Common Log Formats	Access to Server Vars.	Server Push
Apache	No	Yes	No	Yes*	Yes	Yes	Yes	Yes
CERN	No	Yes	No	No	No	Yes	No	No
MacHTTP	Yes	Yes	No	No	No	No	Yes	No
NCSA	No	Yes	No	No	Yes	Yes	Yes	Yes
Netscape	Both	Both	Neither	Comm.	Both	Both	Yes	Yes
HTTPS	Yes	No	No	No	No	No	No	No
Spyglass	No	Yes	Yes	No	Yes	Yes	Yes	N/A
Website NT/Win95	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

* SSleay (Apache variant) supports SSL

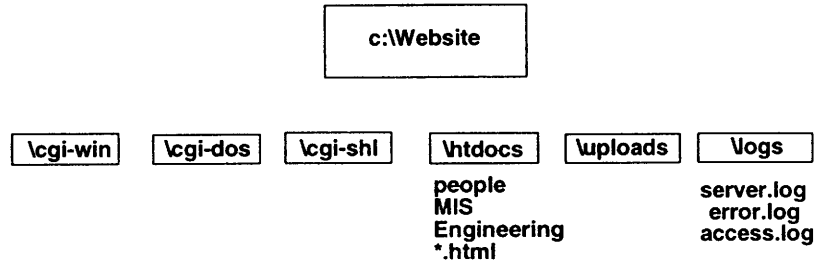
Website v1.1c

[<http://website.ora.com>]

- Available for Windows NT and Windows 95
- Website Professional supports SSL and S-HTTP
- Webview utility allows stats, directory structure, and information to be displayed to the administrator
- Supports Visual Basic, ability for CGI's to access Excel, FoxPro and others
- Directory aliases
- Directory indexing - catalog the directory
- Support for HTML forms
- Server side includes
- Virtual hosts

Website httpd

Configuration Structure



Website v1.1c New Features

- Full support for NCSA imagemaps
- Default document wildcard expansion
- Directory for temporary files that CGI's need
- Heavy monitoring and logging for activities
- Fixes the & escape character DOS command line security flaw while running .BAT files

NCSA httpd v1.5.2

NCSA's HTTP server for setting up a WWW server

[ftp://ftp.ncsa.uiuc.edu:~ftp/Web/httpd/Unix/ncsa_httpd/current]

- Available for BSDI, HPUX 9.05, IRIX4/5, AIX3.2, OSF 3.0, Ultrix, Solaris 2.x, and SunOS 4.1.x, Linux
- Source code is available/pre-compiled binaries are available
- Handles multiple connections very efficiently
- Directory aliases
- Directory indexing - catalog the directory
- Support for the "~" meta-character, but the administrator controls what sub-directories in that area are available for publishing
- Support for HTML forms
- Server side includes
- Virtual hosts

Notes

NCSA httpd v1.5.2 (cont.)

- **Available on CD-ROM**

The NCSA Digital Gallery CDROM

- **Anonymous FTP (see Appendix A)**

`ftp://ftp.ncsa.uiuc.edu:~ftp/Web/httpd/Unix/ncsa_httpd/`

`ftp://sunsite.unc.edu:/pub/packages/infosystems/WWW/
servers/ncsa-httpd`

`ftp://ftp.luth.se/pub/infosystems/www/ncsa/httpd`

NCSA httpd v1.5.2 (cont.)

- **US Mail**

NCSA Documentation Orders

152 Computing Applications Building

605 East Springfield Avenue

Champaign, Illinois 61820-5518

+1.217.244.4130

orders@ncsa.uiuc.edu

NCSA httpd 1.5.2 New Features

- Performance enhancements (multiple servers spawned)
- WebMonitor Mail CGI Program
- Parent <-> Child communication
- Bug fixes for buffer overflow problems
- Configurable Error Messages
- KeepAlive feature for continuing connection
- Fixed bugs for full ImageMap URL's and full Redirect URL's
- DBM support for .htpasswd, .htgroup, and .htdigest files

Notes

Building NCSA httpd

- **Important Makefile rules**

```
CC=gcc
```

```
CFLAGS=-g
```

```
EXTRA_LIBS=
```

- **Important CFLAGS**

```
-DMINIMAL_DNS
```

```
-DMAXIMUM_DNS
```

```
-DPEM_AUTH
```

```
-DXBITHACK
```

```
-DNO_PASS
```

```
-DSECURE_LOGS
```

Notes

NCSA httpd Configuration Files

General Comments

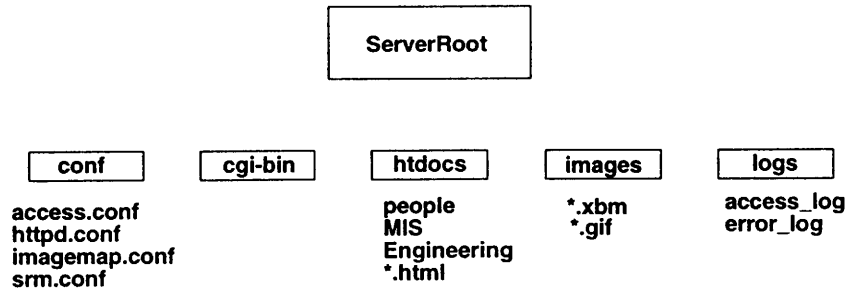
```
access.conf  
httpd.conf  
imagemap.conf  
srm.conf
```

- **Place the configuration files under a revision control system (RCS, SCCS, CVS)**
- **Comment lines start with #**
- **Blank lines are ignored**
- **Each directive must be on a separate line**

Notes

NCSA httpd

Configuration Structure



Notes

NCSA httpd.conf

(server configuration)

external options

- `ServerType`
 - `inetd`
 - `standalone`
- `Port`
 - `###`
- `User`
 - `username/uid`
- `Group`
 - `groupname/gid`
- `ServerAdmin`
- `ServerName`

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Notes

- **NOTE:** `inetd` spawning is useful for testing, but not useful for production. It will force each connection to spawn a separate copy of `httpd`, creating much overhead. `"standalone"` will let the server start and stop child processes when needed.
- **NOTE:** `"port"` is usually 80. Anything below 1024 means the Webserver must be started as root.

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NCSA httpd.conf (cont.)

internal options

- ServerRoot
- Log Files
 - ErrorLog
 - TransferLog
- PidFile
- StartServers (1.4 or greater, specific)
- MaxServers (1.4 or greater, specific)

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Notes

- **NOTE: StartServers/MaxServers are two parameters for tuning performance. When the web server is restarted, the StartServers parameter is how many children should be forked initially, to handle the load immediately. MaxServers**

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NCSA access.conf

(internal and external access control)

Overall document control options

```
<Directory /home/www>
Options Indexes FollowSymLinks
</Directory>

<Directory /home/www/internal>
  AllowOverride All
  <Limit GET>
    order allow, deny
    allow from .cisco.com .mci.com .uniforum.org
    deny from all
  </Limit>
</Directory>
```

Notes

NCSA srm.conf

(resources configuration)

external options

- DirectoryIndex home.html
- AddIcon /icons/text.xbm .html .txt
 AddIcon /icons/movie.xbm .mpg
- DefaultIcon /icons/unknown.xbm
- DocumentRoot
- Redirect
- ErrorDocument (1.4 or greater specific)
 ErrorDocument 404 /error-docs/not-found.html

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Notes

- **NOTE: UserDir is a subdirectory in each users home directory for publishing files using the "~" option on a URL.**

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NCSA srm.conf (cont.)

internal options

- UserDir .htmdir
- AccessFilename .htaccess
- DefaultType text/plain
- Alias /icons /foo/bar/images
 - ScriptAlias /cgi-bin /foo/bar/bin
- IndexIgnore /.htaccess
- AddType .shtml
- Redirect /employees http://www.employees.org

NCSA imagemap.conf

(I think I took a wrong turn at Albuquerque...)

```
guestmap : /mosaic/httpd/htdocs/public/maps/guestmap.map
guestmap2 : /mosaic/httpd/htdocs/public/maps/guestmap2.map
guestbar : /mosaic/httpd/htdocs/public/maps/guestbar.map
canlat.guest : /mosaic/httpd/htdocs/public/maps/map_canlat.guest.map
asiapac.guest : /mosaic/httpd/htdocs/public/maps/map_asiapac.guest.map
map_bar.guest : /mosaic/httpd/htdocs/public/maps/mapbar.guest.map
```

NCSA httpd Miscellaneous Notes

(e.g. it didn't fit anywhere else)

- Display the version number:
`/usr/local/etc/httpd/httpd -v`
- Restarting your server (re-read the configuration files)
`kill -HUP `cat $SERVERROOT/logs/httpd.pid``
- Shutting down the server
`kill -TERM `cat $SERVERROOT/logs/httpd.pid``

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Apache httpd v1.0.5/v1.1.1

Apache's HTTP server for setting up a WWW server

[<ftp://ftp.apache.org/apache/dist/>]

- **Available for HPUX, IRIX4/5, VMS, AIX3.2, Solaris 2.x, SunOS 4.1.x, and many more**
- **SSLeay supports SSL**
- **Source code is available/pre-compiled binaries are available**
- **Customized technique for error control**
- **Encrypted password file control per file/directory**
- **Support for user/hostname pair group access controls per file/directory**
- **More environment variables for CGI's**
- **Support for HTML forms**
- **Inclusion of output from other commands into an HTML document (server side includes)**
- **Virtual Hosts**

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Apache httpd v1.0.5/v1.1.1 (cont.)

Apache's HTTP server for setting up a WWW server

- **Anonymous FTP (see Appendix A)**

`ftp://ftp.apache.org/apache/dist/`

`ftp://ftp.ast.cam.ac.uk/pub/WWW/apache/`

`ftp://bond.edu.au/pub/apache/dist/`

Apache httpd 1.0.5 new features

Apache's HTTP server for setting up a WWW server

- **Designed as "minimal forking model"**
- **Virtual host pages**
- **Extensible API**
- **Released to address the CIAC bulletin: carriage returns were being passed (no escaping done) to CGI scripts**

Apache httpd 1.1 new features

Apache's HTTP server for setting up a WWW server

- Able to read /etc/passwd formatted files for user password files
- Alpha released "perl interpreter" for CGI's - avoiding calling the perl binary
- Complete API and specification

Why Apache httpd?

- Virtual hosts
- Customized error responses (4 different ways, user configurable)
- DOCUMENT_ROOT environment variable set for CGI's
- "Apache is now the most popular Web server in the world"
- Multiple filenames for DirectoryIndex directive
- Apache 1.1
 - PassEnv/SetEnv
 - Anonymous HTTP logins
 - mSQL entitlement module/Berkeley DB entitlement module
 - Identity Check (RFC 1143) now available per directory
 - ForceType forces MIME type presented (overrides filename extensions)
 - SetHandler and AddHandler types for defining filename extensions to be interpreted by function (programmed by user)

Netscape Communication/Commerce httpd server

Netscape's httpd server

[commercial only]

- Available for Dec Alpha OSF/1, HP, IBM AIX, SGI, Sun, Intel BSDI, Windows NT
- Commerce server has SSL
- Server multiple IP addresses properly
- Binary only release with modular entitlement API
- Log summary features
- Encrypted password file control per file/directory/wildcards or template
- Support for user/hostname pair group access controls per file/directory
- Custom error messages
- Support for HTML forms
- Inclusion of output from other commands into an HTML document

Netscape Communication/Commerce Misc.

(everything needs a misc. section)

- Circle, Rectangle, Polygon URL's
- GUI Administrative Interface
- Custom Signatures (without requiring server-side includes)

Startup Script for SunOS 4.1.x

(operating system specific)

- Add the following to `/etc/rc.local`, or create a new file and run it from

```
/etc/rc.local

#!/bin/sh
# HTTPD startup script for SunOS (/etc/rc.httpd)
#

if [ -x /usr/local/etc/httpd ]; then
    /usr/local/etc/httpd &
    echo -n 'httpd'
fi
```

Startup Script for Solaris 2.x

(operating system specific)

- Create a file `/etc/init.d/httpd`

```
#!/bin/sh
# HTTPD startup script for Solaris 2.x(/etc/init.d/httpd)
#
PIDFILE=/etc/httpd.pid # subject to change (per httpd.conf)

case "$1" in
'start')
    if [ -x /usr/local/etc/httpd ]; then
        /usr/local/etc/httpd &
        echo -n 'httpd'
    fi
;;
```

Startup Script for Solaris 2.x (cont.)

(operating system specific)

```
'stop')
  /usr/bin/kill -9 `cat $PIDFILE`
;;

*)
  echo "Usage: /etc/init.d/httpd {start|stop}"
  ;;
esac
```

- **And make symlinks in /etc/rc0.d and /etc/rc2.d**

Startup Script for HPUX 9.0x

(operating system specific)

- **Add the following to /etc/rc {localrc} or create a new file and run it from**

```
/etc/rc {localrc}
```

```
localrc ()
{
if [ -x /usr/local/etc/httpd ]; then
  /usr/local/etc/httpd &
  echo -n 'httpd'
fi
}
```

Startup Script for SGI IRIX 4.05/5.x/6.x

(operating system specific)

- Create a file /etc/init.d/httpd

```
#!/bin/sh
# HTTPD startup script for SGI IRIX (/etc/init.d/httpd)
#
PIDFILE=/etc/httpd.pid # subject to change (per httpd.conf)
IS_ON=/sbin/chkconfig

case "$1" in
'start')
    if $IS_ON httpd; then
        if [ -x /usr/local/etc/httpd ]; then
            /usr/local/etc/httpd &
            echo -n 'httpd'
        fi
    fi
;;

'stop')
    /usr/bin/kill -9 `cat $PIDFILE`
;;

*)
    echo "Usage: /etc/init.d/httpd {start|stop}"
;;

esac
```

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js/dk

Startup Script for SGI IRIX 4.05/5.x/6.x (cont.)

(operating system specific)

- ```
fi
fi
;;

'stop')
 /usr/bin/kill -9 `cat $PIDFILE`
;;

*)
 echo "Usage: /etc/init.d/httpd {start|stop}"
;;

esac
```
- And make symlinks in /etc/rc0.d and /etc/rc2.d

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## Performance Tuning

(it runs like clockwork...)

- **Server Pools**

  - MinSpareServers

  - MaxSpareServers

  - StartServers

  - MaxClients

  - MaxRequestsPerChild

- **Reverse DNS Resolution**

  - Maximum DNS vs Minimum DNS**

- **Caching nameservers**

- **Rotating DNS**

  - www.cisco.com is 5 different machines: www1.cisco.com, www2.cisco.com, www3.cisco.com, www4.cisco.com, www5.cisco.com. The DNS server for .cisco.com returns different answers (rotating through each) for each query, thereby sharing the load. Available in BIND v4.9 and later.**

---

## Notes

## Performance Tuning (cont.)

(it runs like slow clockwork...)

- I/O Performance Problems
- vmstat: tells you user time vs system time.
- If the user time is always higher than system time, the machine is CPU bound.  
If the system time is always higher than the user time, the machine is I/O bound.

**This machine is I/O bound**

```
% vmstat 5
procs memory page disk faults cpu
r b w avm fre re at pi po fr de sr d0 d1 d2 d3 in sy cs us sy id
2 5 0 0 2228 0 18 3 1 0 0 13 1 4 4 0 7132110 413 17 33 50
0 5 0 0 2368 0 34 120 4 92 0 37 1 0 6 011681863 799 9 30 61
3 1 0 0 2260 1 10 68 0 36 0 16 0 0 0 010081414 771 3 14 83
0 3 0 0 2232 1 5 56 16 168 16 54 1 0 2 0 8921607 681 11 20 69
```

---

## Notes

## Performance Tuning (cont.)

(it runs like slow clockwork...)

- **Listen Queues**

[http://www.sun.com/sun-on-net/Sun.Internet.Solutions/performance/tun\\_mon/index.html](http://www.sun.com/sun-on-net/Sun.Internet.Solutions/performance/tun_mon/index.html)

<http://www.apache.org/docs/perf.html>

- **tcpdump - who is hitting my machine?**

**Tells you how many requests are coming in, from whom, and may potentially isolate a host generating too much traffic**

- **netstat - whose machine is goofing mine up?**

**Tells you how many connections are in the middle of the 3-way handshake, and whether or not they are listening for data still left in the Send-Q**

**netstat -an**

**netstat -s**

- **Cisco's LocalDirector/Distributed Director products**

---

## Notes

## Password File Management

(add/change/delete)

- **NCSA and Apache have the `htpasswd` utility**

```
htpasswd -c /home/www/etc/passwd jns
htpasswd /home/www/etc/passwd jns
```

- **CERN has the `htadm` utility**

```
htadm {-adduser|-deluser|-passwd|etc}
```

- **Netscape has entitlement and authorization through extensible modules. You can "roll your own."**

## Server Side Includes

(say what?)

- **NCSA, Apache, Website, and Netscape all support these**
- **Allows the HTML author to include information on the fly, each time the document is accessed**
- **Helpful for "footers" or "headers" which stay static, or a page where the data is constantly changing.**
- **The information can be another file, or output from a program**
- **It's a security risk.**
- **Controlled by `access.conf` and `.htaccess` files.**

```
<Directory /home/www/htdocs/production>
Options IncludesNoExec
</Directory>
AddType text/x-server-parsed-html .shtml
```

## Server Side Includes (cont.)

- Exec directive example

```
** Reload This Page: See More What's Hot Items! **

<!--#exec cmd="/mosaic/htdocs/public/bin/random-hot" -->
```

```
% cat /mosaic/htdocs/public/bin/random-hot
#!/usr/bin/perl
srand ;
$roll = int(rand(5)) + 1 ;
$file="/mosaic/htdocs/public/hot/$roll.html";
open(HOT, "<$file") || die;
while (<HOT>) {
 print $_;
}
close HOT;
```

---

## Notes

## Server Side Includes (cont.)

- **Include directive example**

```
.
.

<H6>
<!--#include virtual="/common/signature.html"-->
</BODY>
</HTML>

% cat /usr/local/etc/httpd/htdocs/common/signature.html

Copyright ©1995 Cisco Systems Inc. 1995</H6>
```

---

## Notes

## Miscellaneous Notes

(e.g. it didn't fit anywhere else)

- **Testing your server**

```
% telnet www.cisco.com 80
Trying 192.31.7.130 ...
Connected to cio-sys.cisco.com.
Escape character is '^]'.
HEAD / HTTP/1.0

HTTP/1.0 200 OK
Date: Tue, 16 Apr 1996 19:26:33 GMT
Server: CCO/1.0.5
Content-type: text/html
Connection closed by foreign host.
%
```

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## Miscellaneous Notes (cont.)

(e.g. it still doesn't fit anywhere else)

- **To inetd or not to inetd**

**Run from inetd to start, as the configuration files change frequently.**

**Switch to standalone for production, where overhead must be minimized.**

- **Update /etc/services**

```
http 80/tcp
```

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## Useful Tips

(e.g. it didn't fit anywhere else either)

- Use document control if there are multiple authors
- Store the documents on a separate disk
- Fast disk, fast network, fast CPU, fast bus speed -- if it's slow, identify the problem, don't buy any solution
- If necessary or practical, separate functionality via multiple machines.
- Have a test section, and the production section.
- If on a Unix box, use the power of group membership and setgid bit's on directories (for new directory creation)

## Schedule

- Introduction ✓
- Browser software/machine ✓
- Server software/machine ✓
- Information
- Responsibility
- Server maintenance
- Tips, Techniques, Servers, and Sites
- Late Breaking News



## Successful Document Organization

(can you find it?)

- **Remember: not all browsers are window based**  
`http://www.infohiway.com/faster/index.html`
- **Remember: the same document can be referenced in different places**
- **Don't overdo hyperlinking**
- **Indexing is a must - search engines, flat files, homegrown...**
- **Keep the structure simple, even when the contents are complex**
- **Uniform presentation - always focus on the important information, provide menu bars where appropriate.**

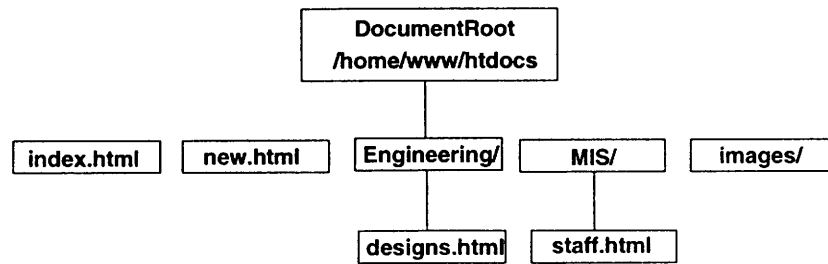
## Document Structure for the WWW

(where does it all go...)

- **DocumentRoot**
  - Home Page**
  - What's New Page**
  - Neat Logo Graphic - keep it small!**
  - Imagemap?**
- **Sub-Directories**
- **Testing zone**

## DocumentRoot

(where does it all go...)



## Schedule

- Introduction ✓
- Browser software/machine ✓
- Server software/machine ✓
- Information ✓
- Responsibility
- Server maintenance
- Tips, Techniques, Servers, and Sites
- Late Breaking News

## Server Responsibility

(Add more people!)

- Establish formatting conventions
- Establish email contacts (`webmaster@foobar.com`, `www@foobar.com`)
- Establish a "webmaster" and a "docmaster"

---

## Notes

## **webmaster@foobar.com**

(The person in charge)

- **Installs, maintains and secures the HTTP server**
- **Verifies links**
- **Manages and organizes the reports for logfiles**
- **Maintains the What's New page**
- **Principal point of contact for problems, questions**
- **Evangelist**

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## **Notes**

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## **docmaster@foobar.com**

(Document organizer)

- **Editor-in-Chief**
- **Responsible for overall content of server**
- **Defines formatting and styles**
- **Interfaces with design review committee**

---

## **Notes**

## Process Management

- Establish change control mechanisms
- Review your own Web site; is it serving the purpose?
- Think ahead: how much will we grow, how much staff is required, are we getting value for the money, are we successful?

## Schedule

- Introduction ✓
- Browser software/machine ✓
- Server software/machine ✓
- Information ✓
- Responsibility ✓
- Server maintenance
- Tips, Techniques, Servers, and Sites
- Late Breaking News

## Server Maintenance

(check the oil and wash the windows, please!)

- **Rotate the logfiles**
  - Rename the log file (on the same filesystem if possible)**
  - Kill the running server process and restart**
  - Compress old logfiles**
- **Separate filesystem (and if possible, disk) for documents**
- **Monitor machines usage to determine adequate hardware requirements**
  - CPU**
  - Network**
- **Backups**
  - A must!**
  - Attempt periodic restores to ensure good tapes**

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ju/dk

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## Notes

- **NOTE: Having separate disk for documents ensures that the disk will only be serving that data and not competing for access with system issues or other applications.**

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ju/dk

## Server Maintenance (cont.)

- **Moving directories**

```
mkdir /home/www/htdocs/production
cd /oldhome/www/htdocs/production
tar cf - . | (cd /home/www/htdocs/production; tar xfbp -)
```

- **Aliases (in srm.conf)**

```
Alias production /home/www/htdocs/production
```

## Statistics for Bean Counters

(what is happening on your server?)

- **wwwstat - generate a log file format for connections (output into html for viewing on a browser)**

```
[http://www.ics.uci.edu/WebSoft/wwwstat/wwwstat-1.01.tar.{Z,gz}]
```

- **gwstat - take the log file from wwwstat and produce graphs**

```
[ftp://dis.cs.umass.edu/pub/gwstat.tar.gz]
```

- **WebStat - break down by domain and country**

```
[ftp://ftp.pegasus.espirit.ec.org/pub/misc]
```

- **AccessWatch**

```
[http://netpresence.com]
```

- **Apache 1.1 has server statistics inside the server**

```
[http://www.apache.org]
```



## Announcing your Server

(I've wasted enough time, let's tell the world!)

- **USENET News:**  
`comp.infosystems.www.announce, comp.internet-net.happenings`
- **NCSA What's New Page**  
`[http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/whats-new.html]`
- **SubmitIT!**  
`[http://submit-it.permalink.com/submit-it/]`
- **Yahoo!**  
`[http://www.yahoo.com]`
- **The Webmaster for the "parent" organization**

## Schedule

- **Introduction ✓**
- **Browser software/machine ✓**
- **Server software/machine ✓**
- **Information ✓**
- **Responsibility ✓**
- **Server maintenance ✓**
- **Tips, Techniques, Servers, and Sites**
- **Late Breaking News**

## More Servers at your Site

(why not have servers serving servers?)

- **anonymous FTP server**  
Provide files as well as content
- **gopher server**  
For legacy documentation...
- **database server**  
For large installations , user profiles, complex data structures
- **whois server**
- **X.500 server**
- **proxy server**

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js/dk

## Proxy Servers

(don't they work in the legal system?)

- **Allow one machine to access "the maze;" all browsers are configured to talk to the one machine.**
- **Builds single entry point into the Internet, narrowing the window of opportunity for subversion.**
- **Allows multiple machines hitting the same content to receive it back faster, and possibly not require going into "the maze" to get a document (lowering network usage)**
- **Netscape**  
[<http://www.netscape.com>]
- **Apache v1.1 module**  
[<http://www.apache.org>]
- **Harvest Cache Accelerator**  
[<http://excalibur.usc.edu>]

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## John and Dave's Tips to a Successful WWW Server

(after all, we're presenting our opinions!)

- Don't get so involved in the presentation, that the information gets buried underneath and is inaccessible.
- Explore other servers, see how they were set up and get ideas from them.
- Remember, not all browsers are graphical browsers – program the HTML docs with care and consideration.
- Think ahead for disk space, network access, and structure.
- Review the setup, remember that things can change.
- Announce, evangelize, and administer the best of the Web.

## John and Dave's Favourite Sites

(after all, we're STILL presenting our opinions!)

- **The WWW Worm**  
[<http://www.cs.colorado.edu/home/mcbryan/WWW.html>]
- **The Security APL Quote Server**  
[<http://www.secapl.com/cgi-bin/qs>]
- **The Homebrewer's Page**  
[<http://alpha.rollanet.org/index.html>]
- **The Uniforum Home Page**  
[<http://www.uniforum.org>]

## Schedule

- Introduction ✓
- Browser software/machine ✓
- Server software/machine ✓
- Information ✓
- Responsibility ✓
- Server maintenance ✓
- Tips, Techniques, Servers, and Sites ✓
- Late Breaking News

Searching

## *Designing & Building Your Enterprise WWW Server*

### *Searching*

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## Schedule

- **Why make your site searchable?**
- **How?**
  - **WAIS**
  - **Verity VDK**
  - **Fulcrum SearchServer**
- **How to "search the Web"**
- **Late Breaking News**

## Why make your site searchable?

(why ask why?)

- Too much information
- Information doesn't lend itself hierarchically
- User requires system to filter for relevancy
- High buzzword content
- Q&A Pair

## What is WAIS?

- Distributed information retrieval system
- TCP/IP client/server architecture
- Publishers provide data on server
  - Text, images, audio, video, etc
  - Indexed by keyword or title
- Consumer queries data by keyword
  - Get an ordered list of relevant matches
  - Selects and retrieves only desired data

## Availability and Information on WAIS

- **CNIDR Distribution - freeWAIS release 0.4 (Jan 1995)**
  - Binaries available for DEC Alpha, Linux, SGI, Solaris, SunOS, Ultrix  
[ftp://ftp.cnidr.org/pub/NIDR.tools/freewais/freeWAIS-0.4.tar.gz]
- **wais-interest**
  - Announcements of new releases (moderated)**
  - Subscribe:** wais-interest-request@think.com
- **wais-discussion**
  - Discussion on publishing issues (moderated)**
  - Subscribe:** wais-discussion-request@think.com
- **wais-talk**
  - Technical discussion for developers**
  - Subscribe:** wais-talk-request@think.com

## Building Indexes with freeWAIS

(an abstraction)

- **Indexing allows for faster searches**
  - Less compute intensive queries
- **How do you do it?**
  - Identify the data you wish to index
    - text files, graphics, sounds, etc
  - Run `waisindex` on the data
    - Indexes words in data
    - Creates a source structure (`file.src`)
    - Takes about the same space as original data



## What is Verity VDK?

- API and search tools for "collections"
- Publishers provide data on server
  - Multiple data types
- Configurable on how to build, and how to present
- Consumer queries data by keyword(s)
  - Get an ordered list of relevant matches
  - Selects and retrieves only desired data

## Availability and Information on VDK

- Verity, Inc.
  - Binaries available for SunOS 4.x, Solaris 2.x, SGI IRIX 5.x
  - [<http://www.verity.com>]

## Building Indexes with VDK

(an abstraction)

- **How do you do it?**
  - Identify the data you wish to index**
  - Identify collection type, name, fields, searchable fields**
  - Run `mkvdk` on the data**
  - Result: hashed searchable index**
  - Can be run in incremental only mode**

## What is Fulcrum SearchServer?

- **Consumer queries data by keyword(s)**
  - **Get an ordered list of relevant matches**
  - **Selects and retrieves only desired data**
- **API Available**
- **Multiple products available to fit needs**
- **Built for Windows based platforms**

## Availability and Information on Fulcrum

- **Fulcrum, Inc.**  
[<http://www.fulcrum.com>]

## Searching the Web

- **The Lycos Home Page: Hunting WWW Information**  
[<http://lycos.cs.cmu.edu/>]
- **WWW - World Wide Web Worm**  
[<http://www.cs.colorado.edu/home/mcbryan/WWW.html>]
- **WebCrawler Searching**  
[<http://webcrawler.com/>]
- **Internet Sleuth**  
[<http://www.intbc.com/sleuth/>]
- **Yahoo**  
[<http://www.yahoo.com/>]

## Schedule

- Why make your site searchable? ✓
- How? ✓
- How to "search the web" ✓
- Late Breaking News

# Robots

*Designing & Building Your Enterprise WWW Server*

*WWW Robots*

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jns/dk

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**Notes**

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jns/dk

## What Are Robots?

(Mister Roboto)

- **A program that automatically explores the World Wide Web**
- **Detects links in documents and follows them**
- **Performs some useful (?) action on each item found**
- **What kinds of actions?**
  - Index the documents visited**
  - Discover and/or graph representation of the Web**
  - Maintenance tool to verify links**
  - Tally the references to something**
- **Often called spiders; less frequently wanderers**

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ms/dlk

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## Notes

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ms/dlk

## Robot Examples

So what are some popular robots and what do they do?

- **Resource discovery**
  - Robots that go out on the net just to find resources**
  - Typically provide a public index in to it's results**
  - Some also collect and generate statistics**
- **Examples:**
  - JumpStation** -- <http://js.stir.ac.uk/jsbin/jsii>
  - RBSE** -- <http://rbse.jsc.nasa.gov/eichmann/urlsearch.html>
    - Repository Based Software Engineering**
  - WebCrawler** -- <http://webcrawler.com/>
    - Now operated by AOL**

---

## Notes



## Robot Examples

(continued)

- **More resource discovery examples**

**WWW** -- <http://www.cs.colorado.edu/home/mcbryan/Home.html>

**World Wide Web Worm**

**Lycos** -- <http://lycos.cs.cmu.edu/>

**InfoSeek** -- <http://www.infoseek.com>

**Both free and fee searches**

**Search Wizard** -- <http://www.spry.com/wizard/index.html>

**Built by Spry, run by CompuServe**

**Fish Search** -- <http://www.win.tue.nl/bin/fish-search>

**Resource discovery on-the-fly**

---

## Notes

## Robot Examples

(continued)

- **HTML and/or link validation**
  - Examines a WWW site for valid links or HTML syntax
  - Usually limits traversal to one site, or one hop off site
- **Examples:**
  - Checkbot** -- <http://dutifp.twi.tudelft.nl:8000/checkbot-info.html>
  - html\_analyzer** -- [http://www.gatech.edu/pitkow/html\\_analyzer/](http://www.gatech.edu/pitkow/html_analyzer/)
    - No longer supported by author
  - MOMspider** -- <http://www.ics.uci.edu/WebSoft/MOMspider/>
  - EIT Link Verifier** --  
[http://wsk.eit.com/wsk/dist/doc/admin/webtest/verify\\_links.html](http://wsk.eit.com/wsk/dist/doc/admin/webtest/verify_links.html)
  - WebWatch** -- <http://www.specter.com/users/janos/specter>

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js4dlk

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## Notes

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js4dlk

## Robot Examples

(continued)

- **WWW mirroring**  
**Replicates a WWW site on another WWW server**
- **Examples:**
  - HTMLgobble --**  
`ftp://ftp.rz.uni-karlsruhe.de/pub/net/www/tools/htmlgobble.tar.gz`
  - tarspider --** `http://www.chemie.fu-berlin.de/user/chakl/Spider.html`
  - GetURL --** `http://www.cs.latrobe.edu.au/~burton/Public/`  
**Also validates links**
  - WebCopy --** `http://www.inf.utfsm.cl/~vparada/webcopy.html`

---

## Notes

## Robot Examples

(continued)

- **Other miscellaneous robot uses**

**NorthStar** -- <http://comics.scs.unr.edu:7000/top.html>

**Textual analysis of the Web versus GopherSpace**

**World Wide Web Wanderer** -- <http://www.netgen.com/info/growth.html>

**Measures growth in Web**

**WebLinker** -- <http://www.cern.ch/WebLinker/>

**URN to URL conversion**

**Katipo** -- <http://www.vuw.ac.nz/~newbery/Katipo.html>

**Checks browser history files for changed links**

---

## Notes

## So how do they do it?

- Usually starts at a fixed or configurable location
- Examines all the links in that document
- If it finds a useful link, it either...
  - caches the link for future use
  - or follows the link
- Then it does the same thing for this new document
- Along the way, the robot is presumably doing something useful
  - Indexing the document
  - Collecting statistics
  - Looking for something

---

## Notes

## So how do they do it?

(continued)

- **Things to consider**
  - Whether we've been there before or not**
  - How hard we're hitting the network or a server**
  - If we're getting too deep for useful information**
  - Whether the robot is welcome or not**
- **Guidelines for Robot Writers:**
  - <http://info.webcrawler.com/mak/projects/robots/guidelines.html>

---

## Notes

## A Mathematical Digression

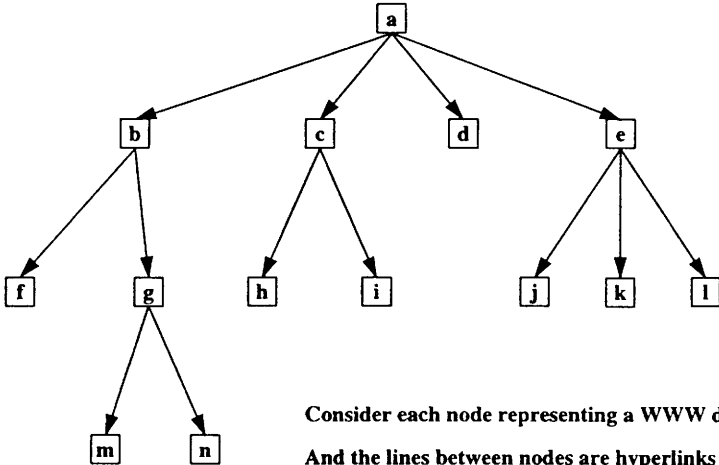
(not fractions, please!)

- **The mathematics of robots... some graph theory**
- **Breadth-first traversal**
  - Means to examine all the first level nodes first
  - Then move on to the seconds level nodes
  - And so forth
- **Depth-first traversal**
  - Means to examine each deeper level node as you come to it
  - When you reach a leaf node (w/no deeper nodes), back out
  - And continue from where you entered that node

---

## Notes

# Breadth-First Traversal



---

## Notes



## **Breadth-First Traversal**

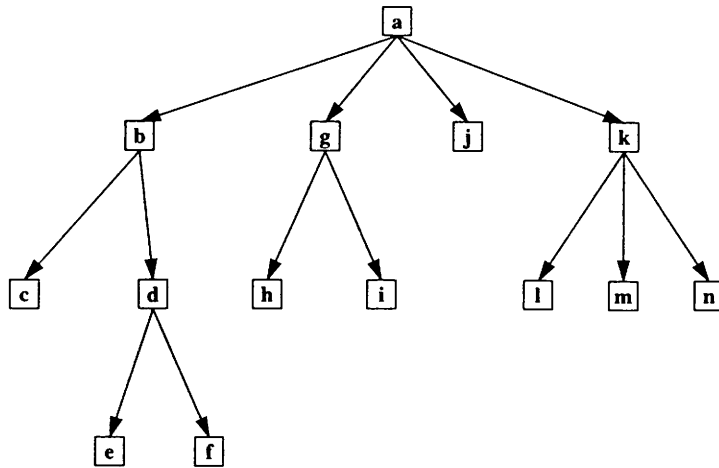
(why or why not?)

- **Advantages**
  - Accesses a lot of sites relatively quickly**
  - Starts finding more general data**
  - Tends to progress to more detail the longer it runs**
- **Disadvantages**
  - Harder to code**
  - More history to keep track of**

---

## **Notes**

## Depth-First Traversal



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js/dk

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## Notes

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js/dk

## Depth-First Traversal

(why not or why?)

- **Advantages**
  - Access all of a given site relatively quickly
  - Mostly useful for mirroring robots
  - Easier to code (recursion)
- **Disadvantages**
  - Focuses on localized part of Web first
  - Takes a relatively long to find a lot of sites
  - Finds cyclic links more easily

---

## Notes

## Problems With Cyclic Links

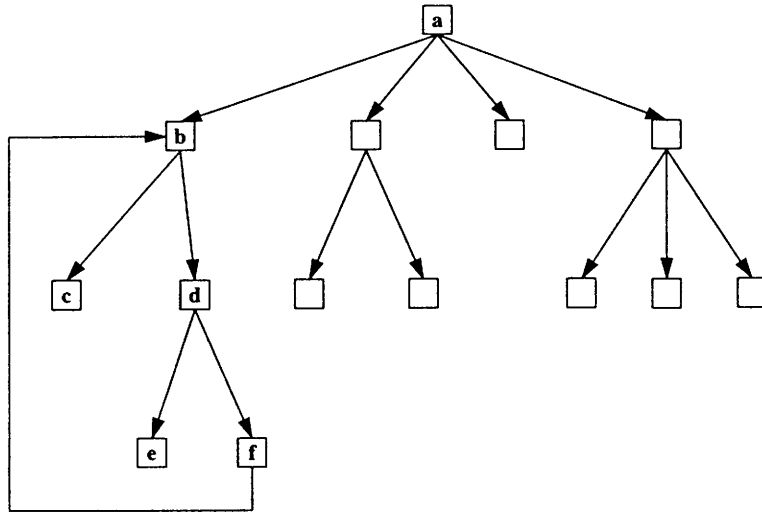
(like a bike chain?)

- **The biggest problem is that the WWW is not a tree**
  - It is a arbitrarily connected, directed graph**
  - Links can refer to any node, not just lower nodes**
  - Including higher depth nodes**
- **Consider what happens when a cyclic link exists**
- **This is the problem:**
  - The case of links to any parent node**
- **Unknowing robots could loop infinitely**

---

## Notes

## Cyclic Links



---

## Notes

## Robots.txt File

- **Instructions to keep robots off your site, or at least limit their access**
- **Why would you want to?**
  - Robots could be trashing your network or server**
  - You may have sensitive info you don't want indexed**
- **How do you do it?**
  - Create robots.txt in root of your docs tree**
  - Specify one or more User-agent: lines**
  - And specify the URL space to Disallow:**

---

## Notes

## Robots.txt File

(How does it work?)

- **A well behaved robot will check this file**  
**If the User-agent matches the robot**  
**the subsequent Disallow lines apply**  
**Note: not guaranteed**
- **More information available at**  
**<http://info.webcrawler.com/mak/projects/robots/norobots.html>**

---

## Notes

## Robots.txt Example

# The robots.txt file to restrict robot activity

# First, let our mirror robot do it's work  
User-agent: WebCopy  
Disallow:

# Let our link validator work  
User-agent: Checkbot  
Disallow:

# Then, request robots to stay out of our private lives  
User-agent: \*  
Disallow: /private/

---

## Notes



## Schedule

- Robots
- Late Breaking News

# Legacy Systems

*Designing & Building Your Enterprise WWW Server*

*Legacy Systems*

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**John Stewart**  
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---

**Notes**

2

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## What is legacy information?

- Pre-existing documentation
- Documents that were already there
- Various non-HTML file formats
- Pre-existing services
  
- Documents that you are stuck with, either because...
  - There's no way to get rid of them
  - Or no desire to get rid of them

---

## Notes

## Linking Existing Services: Gopher

"What should I do with my old gopher server?"

- **Option 1: Keep it!**
  - Since HTTP can reference gopher servers, just link to it
  - Still has the look of a flat file
  - Two servers to maintain, even if content static
  - But many gopher servers can now provide HTML as well
  - Not sure why you'd use this if you have HTTP server
- **Option 2: Transition docs to HTTP server**
  - Rewrite gopher docs in HTML and transition to HTTP server
  - Time consuming if you have lots of gopher docs
  - Especially if you want to embed hyperlinks
  - But can do a logical piece at a time

---

## Notes

## Linking Existing Services: Gopher

"What should I do with my old gopher server?"

- **Option 3: Copy docs to HTTP server and blow it away**
  - Easier than rewriting**
  - Still needs work to create links**
  - Unless you use directory structure for navigation**
  - But docs retain text-file feel**
- **Note:**
  - Some gopher servers can reference HTTP servers**
  - However, most gopher-only clients can't follow the link**

---

## Notes

## Mailing List Archives

- **Hypermail allows you to put mailing list archives on-line**  
<http://www.eit.com/software/hypermail/hypermail.html>
- **Takes a standard Unix mailbox and creates hyperlinked documents**
- **Generate incrementally or in bulk**
- **Index by date, author, thread and/or subject**
- **Basic procedure:**
  - Obtain and compile software (C)**
  - Build a configuration file**
  - Ton'o options, but in practice only need a few**
  - Put a link to URL from your server**
  - Set up mail alias for list to hypermail**
  - Start sending mail**

---

## Notes

## Flat ASCII

"I have lots of ASCII files; what can I do with them?"

- **Option 1: create links to ASCII files**
  - Will be retrieved with MIME type text/plain
  - Typically rendered in fixed pitch font
  - Looks rather primitive
- **Option 2: incorporate in to HTML files**
  - Import ASCII file in HTML file
  - Put inside of `<PRE>...</PRE>` block
  - `<PRE>` block rendered in fixed pitch font
  - But can include other HTML around block

---

## Notes



## Flat ASCII

(continued)

- **Option 3: convert to HTML**

**Edit ASCII file by hand**

**Mark up with <P>, <H1>, <EM>, etc, as appropriate**

- **Converters**

    txt2html.pl -- <http://homepage.seas.upenn.edu/~mengwong/txt2html.html>

    txt2html -- <http://www.cs.wustl.edu/~seth/txt2html>

    WEBIT -- <http://futures.wharton.upenn.edu/~attau791/webit.html>

---

## Notes

# PostScript

(trivial)

- No standard way to embed in HTML files
- Create links to PostScript files
- Modify browser to invoke PostScript viewer on application/postscript
- PostScript viewers freely available for...

**X Windows -- ghostview (requires ghostscript)**

<http://www.cs.wisc.edu/~ghost/ghostview/index.html>

<http://www.cs.wisc.edu/~ghost/ghostscript/index.html>

**Windows -- GSview (also requires ghostscript)**

<http://www.cs.wisc.edu/~ghost/gsview/index.html>

**Macintosh -- Mac GS Viewer**

<http://www.glyphic.com/glyphic/projects/macgs.html>

---

## Notes

## Formatted Documents

We use (MS Word, Frame Maker, Word Perfect...); how can I get docs on the Web?

- **Option 1: Use an HTML converter**

**MS Excel -- Excel to HTML for Mac**

<http://www.rhodes.edu/software/readme.html>

**Frame Maker -- fm2html**

<http://www.w3.org/hypertext/WWW/Tools/fm2html.html>

**Frame Maker -- WebMaker**

<http://www.cern.ch/WebMaker/>

**LaTeX -- LaTeX2HTML**

<http://cbl.leeds.ac.uk/nikos/tex2html/doc/latex2html/latex2html.html>

**Rich Text Format -- rtftohtml**

[ftp://ftp.cray.com/src/WWWstuff/RTF/rtftohtml\\_overview.html](ftp://ftp.cray.com/src/WWWstuff/RTF/rtftohtml_overview.html)

---

## Notes

## Formatted Documents

(option 1, continued)

**TROFF -- troff2html**

<http://www.cmpharm.ucsf.edu/~troyer/troff2html/>

**Word Perfect -- WP2X (WordPerfect to anything)**

[http://www.milkyway.com/People/Michael\\_Richardson/wp2x.html](http://www.milkyway.com/People/Michael_Richardson/wp2x.html)

**Word Perfect -- WPTOHTML**

<ftp://oak.oakland.edu/SimTel/msdos/wordperf/wpt51d10.zip>

<ftp://oak.oakland.edu/SimTel/msdos/wordperf/wpt60d10.zip>

- **If your word processor is not listed above, check**  
<http://union.ncsa.uiuc.edu/HyperNews/get/www/html/converters.html>
- **Note: some pkgs will require a special template or format**

---

## Notes

## Formatted Documents

(more options!)

- **Option 2: Print to PostScript or (yuk!) ASCII**  
Described previously
- **Option 3: Add MIME type to support word processor format**  
Determine if MIME type already exists  
`ftp://ftp.isi.edu/in-notes/iana/assignments/media-types`  
If not, invent an "experimental" one: `application/X-type`  
Next, modify server to send wp documents as MIME type  
Usually in file `conf/mime.types`:  

```
mime/type ext
```

Finally, modify browser to invoke wp on `mime/type`  
Browser specific

---

## Notes

## Adobe Acrobat

- **Many sites are now providing Portable Document Format (PDF) files**
  - Adobe invented Portable Document Format (PDF)**
  - And markets numerous Acrobat products to generate PDF files**
  - But gives away their Acrobat reader (currently v2.1)**
    - <http://www.adobe.com/acrobat/>
  - Versions available (binary only) for:**
    - Windows, Mac, SGI, SunOS, Solaris, IBM and HP**
- **To publish PDF files, buy Acrobat PDF Writer, or equivalent**
- **To view PDF files**
  - Download free version of Acrobat Reader**
  - Configure browser to invoke reader on application/pdf**
- **PDF also being extended to include embedded hyperlinks**

---

## Notes

**Acrobat 3.0 is currently available in beta.**

## Image Tools

- **Browsers support in-line GIF images, some support JPG**  
**Other image formats require external viewers**
- **Gobs of tools available to convert or massage images; canonical list at:**  
[http://www.public.iastate.edu/~stark/gutil\\_sv.html](http://www.public.iastate.edu/~stark/gutil_sv.html)
- **X Windows**  
**NetPBM -- Portable Bitmap toolkit; non-GUI but very powerful**  
<ftp://export.lcs.mit.edu/R5contrib/netpbm-1mar1994.tar.gz>  
**xv -- Cool image viewer/manipulator (Author's choice!)**  
<ftp://ftp.cis.upenn.edu/pub/xv/xv-3.10a.tar.gz>
- **MS Windows**  
**LView Pro -- Shareware Windows tool**  
<http://www.lview.com/>

---

## Notes

## Image Tools

(continued)

- **Macintosh**

Giffer -- shareware for the Mac

<ftp://sumex-aim.stanford.edu/info-mac/gst/grf/giffer-112.hqx>

Debabelizer -- notable commercial package for Mac

From Equilibrium Technologies



# HTML Programming

*Designing & Building Your Enterprise WWW Server*

*HTML Programming*

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**John Stewart**  
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**Notes**

## Schedule

- **HTML Authoring**
- **Formatting Directives**
- **List Structures**
- **Images and Multimedia**
- **Anchors and URLs**
- **Tricks of the Trade**
- **HTML Tables**
- **HTML Forms**
- **Late Breaking News**

1

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## Notes

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## HyperText Markup Language Programming Overview

- **HTML is a page markup language -- not a structured description language**
  - You provide "hints" about how you want the page to look**
  - Browser renders it as sees fit**
- **HTML is widely implemented at v2.0**
  - 3.2 is in in draft form with some industry support**
  - Some browsers implement their own extensions to HTML**
- **HTML is an application of SGML**

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## Notes

**SGML == Standard Generalized Markup Language**

**HTML 3.0 (issued in March 1995) never gained wide industry support due to its complexity. The draft has expired, and was superseded by a much simplified draft HTML 3.2 spec.**

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## General Formatting Hints

- **Some general formatting guidelines**
  - White space is ignored, both vertical and horizontal**
  - Take advantage of white space to make document readable**
  - Leave blank lines**
  - Indent text when logically nested**

---

## Notes

## HTML Tags

(it's a kids game, right?)

- **HTML formatting is done through tags**  
    **Formatting directives to browser**
- **Short mnemonic enclosed in angle brackets**  
    <TAG>
- **Some directives require closing tags**  
    <TAG>...</TAG>
- **Some directives take optional modifiers (attributes)**  
    <TAG MODIFIER="VALUE">
- **Case is NOT sensitive**  
    <TAG> is the same as <tAg>

---

## Notes

## Document Layout Directives

- Several tags are used to lay out HTML document
  - <HTML> delimits the SGML application
  - <HEAD> delimits the document header
  - <BODY> delimits the body of the document
- All of these require closing tags
  - i.e. <HTML>...</HTML>

---

## Notes

## Document Layout Sample

```
<HTML>
 <HEAD>
 Header of document goes here.
 </HEAD>

 <BODY>
 Body of document goes here.
 </BODY>
</HTML>
```

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## Notes

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## What Goes in the Document Head?

(I'll leave that one alone...)

- **At least the document title should appear in the <HEAD>**  
`<TITLE>...</TITLE>` identifies the title of the document  
Identify the contents of the document in global context
- **Optionally identify the base URL of the document**  
`<BASE HREF="http://www.cisco.com/sample.html">`
- **Comments are enclosed within a <!-- ... --> construct**
- **A special prologue is suggested ahead of <HEAD>**  
`<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">`  
`<!DOCTYPE HTML PUBLIC "-//W3O//DTD HTML 3.2 Draft//EN">`
- **Identifies as HTML version 2.0 or 3.2 as appropriate**

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m/dk

---

## Notes

**Reasons to make title meaningful:**

**Browsers often use title for bookmarks/hotlist**

**Search pages (Yahoo!, Lycos, Web Crawler) key off title**

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m/dk

## Document Head Sample

```
<!--DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN"-->
<HTML>
 <HEAD>
 <TITLE>What Goes in the Document Head?</TITLE>
 <BASE HREF="http://www.cisco.com/sample.html">
 </HEAD>

 <BODY>
 Body of document goes here.
 </BODY>
</HTML>
```

---

## Notes

## Schedule

- **HTML Authoring**
  - Formatting Directives**
  - List Structures**
  - Images and Multimedia**
  - Anchors and URLs**
  - Tricks of the Trade**
- **HTML Tables**
- **HTML Forms**
- **Late Breaking News**

---

## Notes

## Section Headings

- Use `<Hx>` to identify section headers within your document  
Where x is nesting level, 1..6
- Requires a closing tag: `<H1>...</H1>`
- Generally rendered as large/bold font
- Font gets smaller as numbers increase

---

## Notes

## Section Headings Sample

```
<HTML>
 <HEAD>
 <TITLE>Boring Heading Examples</TITLE>
 </HEAD>

 <BODY>
 <H1>Boring Top Level Heading</H1>
 <H2>And A Boring Second Level Heading</H2>
 <H3>An Even More Boring Third Level Heading</H3>
 <H4>How Much More Boring Can A Fourth Level Be?</H4>
 <H5>Fifth Level... Going... Going...</H5>
 <H6>And The Sixth Level Heading... Gone!</H6>
 </BODY>
</HTML>
```

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---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/headings.html>

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File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Reload Images Open Print Find

Location: UNIFORUM-TUTORIAL96/headings.html

What's New What's Cool Handbook Net Search Net Directory



# Boring Top Level Heading

## And A Boring Second Level Heading

### An Even More Boring Third Level Heading

#### How Much More Boring Can A Fourth Level Be?

##### Fifth Level... Going... Going...

##### And The Sixth Level Heading... Gone!

## More on Section Headings

- **Headings do not necessarily need to flow in order**
- **Often (mis)used to show emphasis**
- **HTML 3.2 incorporates heading alignment**
  - Normally, headings are left justified
  - Alignment modifier allows you to override default
  - `<H1 ALIGN=LEFT|CENTER|RIGHT>...</H1>`
- **Unrecognized tags and modifiers are ignored by browser**
- **Sample:**
  - ...
  - `<H1 ALIGN=CENTER>Centered Top Level Heading</H1>`
  - ...

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---

## Notes

Use `<STRONG>`, `<EM>` instead of `<Hn>` for emphasis

`<H1 ALIGN=CENTER>` is the same as `<H1>` if browser doesn't grok ALIGN

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## Paragraphs

- Free format text is written as paragraphs
- `<P>` tag identifies paragraph
- Spec says to use a closing tag `<P>...</P>`
- Typically rendered with a blank line between paragraphs
- Author has no control over where lines break within paragraph
- Back to back `<P><P>` tags are typically rendered as one `<P>`
- HTML 3.2 allows for paragraph alignment (aka justification)  
`<P ALIGN=LEFT|CENTER|RIGHT>`

---

## Notes

Closing paragraph tag `</P>` can safely be omitted.



## Paragraph Sample

<H1>Typing Sample</H1>

<P>

Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation or any nation so conceived and so dedicated can long endure....

</P>

<P>

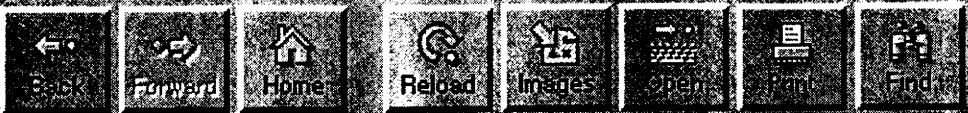
Note how in these paragraphs, the line breaks in the source do not correspond with the breaks in the rendered version. Note also the use of indentation to make source more legible.

</P>

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/paragraph.html>



Location: UNIFORM-TUTORIAL96/paragraph.html

What's New What's Cool Handbook Net Search Net Directory

### Typing Sample

Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation or any nation so conceived and so dedicated can long endure....

Note how in these paragraphs, the line breaks in the source do not correspond with the breaks in the rendered version. Note also the use of indentation to make source more legible.

## Forcing Line Breaks

- The `<BR>` tag allows you to force a line break
- Normally text is free formatted, `<BR>` allows formatting control
  - Hint: if you're doing a lot of `<BR>`, consider `<PRE>`
  - Netscape introduced `<NOBR>` to keep a paragraph from wrapping
- The `<HR>` tag inserts a horizontal rule in your document
  - Often rendered as a "recessed" line
  - HTML 3.2 includes several attributes
    - `<HR ALIGN>` to specify left, center or right
    - `<HR SIZE>` to specify thickness in pixels
    - `<HR WIDTH>` to specify width in either pixels or percentage
    - `<HR NOSHADE>` to remove the recessed look

---

## Notes

## Line Break Sample

```
<HTML>
<HEAD>
 <TITLE>Breaks</TITLE>
</HEAD>

<BODY>

<H1>Line Breaks and Horizontal Rules</H1>

If you are writing text and you wish to enforce

a line break at a certain point for some reason

you can use the BR directive.

<HR>

You can separate logical sections using the HR

tag. Some browsers will render this in 3-D.

</BODY>
</HTML>
```

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pub/dit

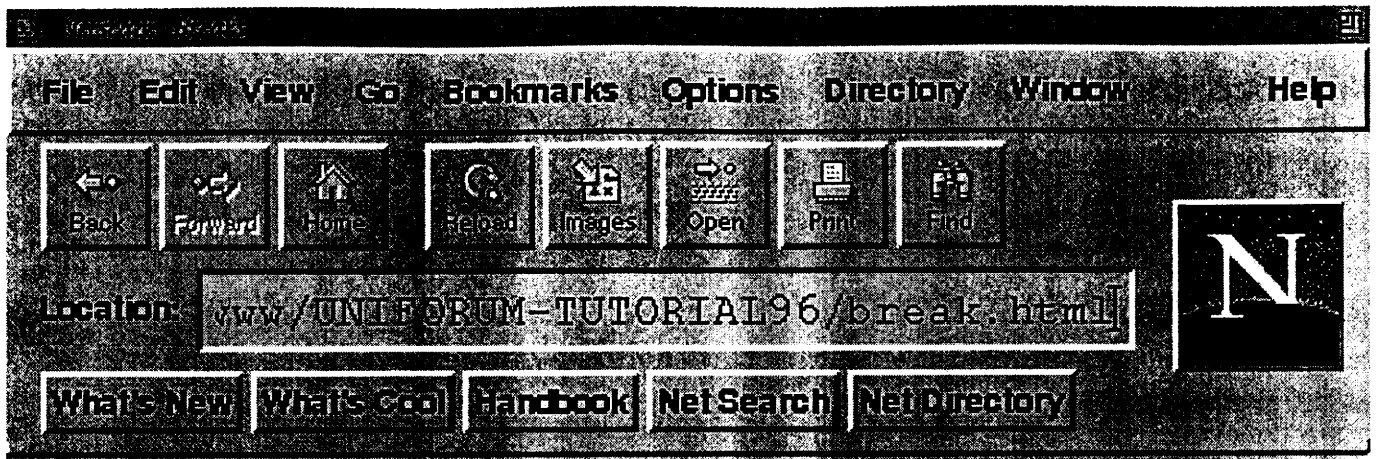
---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/break.html>

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pub/dit



## Line Breaks and Horizontal Rules

If you are writing text and you wish to enforce a line break at a certain point for some reason you can use the BR directive.

---

You can separate logical sections using the HR tag. Some browsers will render this in 3-D.



## Emphasizing Text

- **Idiomatic elements**
  - `<EM>...</EM>` emphasizes text (typically rendered as italic)
  - `<STRONG>...</STRONG>` puts strong emphasis (typically rendered bold)
- **The less preferred method... typographic elements**
  - `<I>...</I>` specifies italic text
  - `<B>...</B>` specifies bold text
  - `<TT>...</TT>` specifies teletype (fixed space) text
- **New for HTML 3.2**
  - `<U>...</U>` specifies underlined text
  - `<STRIKE>...</STRIKE>` specifies strikethrough text
  - `<BIG>...</BIG>` and `<SMALL>...</SMALL>` for changing font size
  - `<SUB>...</SUB>` and `<SUP>...</SUP>` for subscript and superscript

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jas/dlk

---

## Notes

Use the typographic tags sparingly - only if you absolutely need italics or bold

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## Emphasis Sample

`<H1>Emphasizing and Bolding Text</H1>`

`<P>This is a boring sample that shows how <STRONG>  
the STRONG tag is typically rendered as bold </STRONG>  
and how <EM> the EM tag is typically rendered as italic  
</EM>.`

`<P>It also has samples of the old <B> B tag for bold  
</B>, and <I> I for italics </I> and even <TT>  
TT for teletype </TT>.<P>`

And, of course, we have to mention HTML 3.2's `<U>` U tag  
for underline `</U>`, and the `<STRIKE>` STRIKE tag for  
strike-out `</STRIKE>`. And there's `<BIG>` BIG `</BIG>`  
and `<SMALL>` SMALL `</SMALL>`, `<SUB>` SUB `</SUB>` and `<SUP>`  
SUP `</SUP>`. Note that older browsers ignore them.

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jes/dik

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/emphasis.html>

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jes/dik

File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Reload Images Open Print Find

Location: UNIFORM-TUTORIAL96/emphasis.html

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## Emphasizing and Bolding Text

This is a boring sample that shows how **the STRONG tag is typically rendered as bold** and how *the EM tag is typically rendered as italic*.

It also has samples of the old **B tag for bold**, and *I for italics* and even TT for teletype.

And, of course, we have to mention HTML 3.2's U tag for underline, and the ~~STRIKE tag for strike-out~~. And there's **BIG** and SMALL, <sub>SUB</sub> and <sup>SUP</sup>. Note that older browsers ignore them.



## Displaying Special Characters

- A special construct exists for displaying special characters

All ISO Latin-1 characters available

`&abc;` defines a special character

- The following are most common:

Less Than        `&lt;`

Greater Than    `&gt;`

Spanish ñ        `&ntilde;`

Quote            `&quot;`

Ampersand       `&amp;`

---

## Notes

## Special Characters

(continued)

- Can also render any ASCII character with `&#val;`  
Where val is decimal ASCII value
- HTML 3.2 validated a few more:  
Registered TM    `&reg;`  
Copyright        `&copy;`
- The complete list can be found at:  
[\[http://www.w3.org/hypertext/WWW/MarkUp/html-spec/html-spec\\_9.html#SEC101\]](http://www.w3.org/hypertext/WWW/MarkUp/html-spec/html-spec_9.html#SEC101)

---

## Notes

## Special Characters Sample

`<H1>Special Characters</H1>`

Following are some common special characters that you may use in your HTML documents:`<P>`

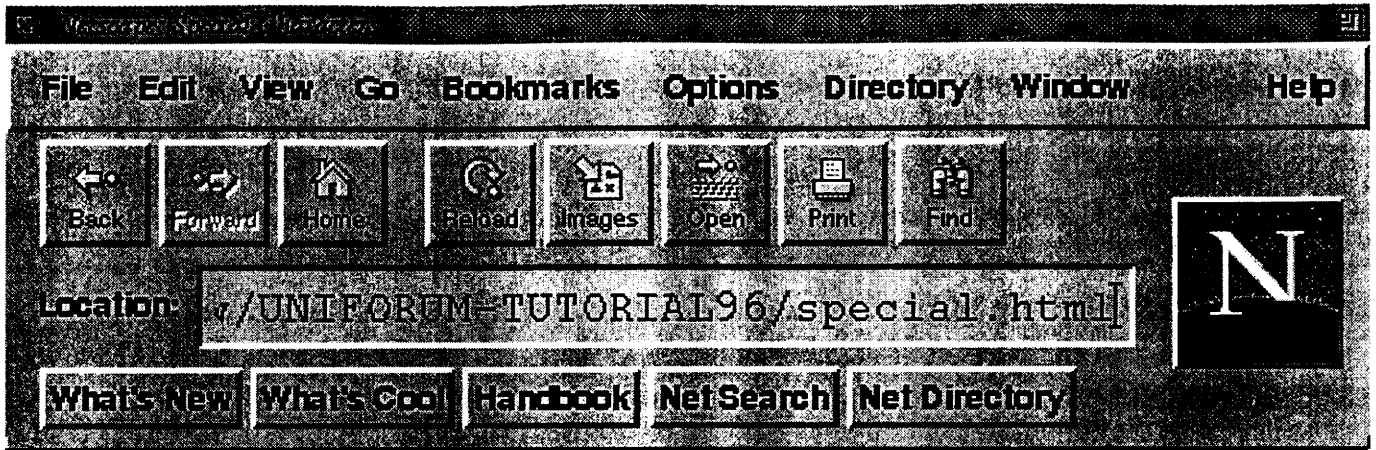
`&lt;` is rendered with `&amp;lt;`;`<BR>`  
`&gt;` is rendered with `&amp;gt;`;`<BR>`  
`&ntilde;` is rendered with `&amp;ntilde;`;`<BR>`  
`&quot;` is rendered with `&amp;quot;`;`<BR>`  
`&amp;` is rendered with `&amp;amp;`;`<BR>`  
`&reg;` is rendered with `&amp;reg;`;`<BR>`  
`&copy;` is rendered with `&amp;copy;`;`<BR>`

A complete list is available in the  
`<A HREF="http://www.w3.org/hypertext/WWW/MarkUp/html-spec/html-spec_9.html#SEC101">`  
ISO Latin 1 Character Entity Set`</A>`  
(`http://www.w3.org/hypertext/WWW/MarkUp/html-spec/html-spec_9.html`).

---

## Notes

See: `http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/special.html`

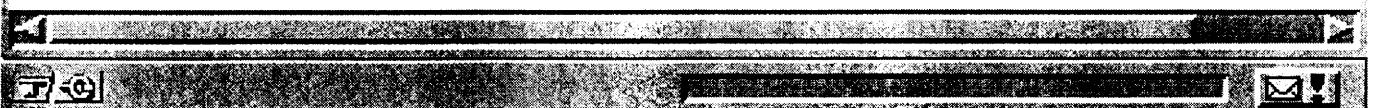


## Special Characters

Following are some common special characters that you may use in your HTML documents:

- < is rendered with &lt;
- > is rendered with &gt;
- ñ is rendered with &ntilde;
- " is rendered with &quot;
- & is rendered with &amp;
- ® is rendered with &reg;
- © is rendered with &copy;

A complete list is available in the [ISO Latin 1 Character Entity Set](http://www.w3.org/hypertext/WWW/MarkUp/html-spec/html-spec_9.f) ([http://www.w3.org/hypertext/WWW/MarkUp/html-spec/html-spec\\_9.f](http://www.w3.org/hypertext/WWW/MarkUp/html-spec/html-spec_9.f))



## Quotations and Citations

- **Two tags exist for including quoted material in your document**
  - `<BLOCKQUOTE>...</BLOCKQUOTE>` inserts an indented quotation
  - `<CITE>...</CITE>` inserts a citation (like a book title) in-line
- **Typically rendered in an italic font.**
- **Both use proportional space fonts.**
- **Both require a closing tag.**

---

## Notes

## Quotations Sample

<H1>Quotations and Citations</H1>

In his <CITE>Gettysburg Address</CITE>, President Lincoln began

<BLOCKQUOTE>

Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation or any nation so conceived and so dedicated can long endure....

</BLOCKQUOTE>

---

## Notes


See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/citations.html>

File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Reload Images Open Print Find

Location: JNIBORUM-TUTORIAL96/citations.html

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## Quotations and Citations

In his *Gettysburg Address*, President Lincoln began

Four score and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation or any nation so conceived and so dedicated can long endure....

## Preformatted Text

- There are several elements that tend to display preformatted text
- Rendered as separate blocks, typically in fixed space font
  - `<PRE>...</PRE>` is for blocks of preformatted text
    - Optional `<PRE WIDTH=cols>` attribute gives browser size hints
    - Markup elements interpreted
  - `<XMP>...</XMP>` is for program examples
    - Markup elements ignored
  - `<LISTING>...</LISTING>` is for program listings
    - Similar to `<PRE>` with `WIDTH` set to 132
    - Tabs should be rendered at 8 spaces
    - Markup elements ignored
- Beware: inconsistently implemented (see sample)

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## Notes

Note that `<XMP>` and `<LISTING>` are no longer in HTML 3.2 (deprecated)

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## Preformatting Sample

```
<H2>Sample using <PRE></H2>
<PRE>
main(argc,argv)
 int argc;
 char **argv;
 {
 printf("Hello world!\n");
 }
</PRE>

<H2>Sample using <XMP></H2>
<XMP>
main(argc,argv)
 int argc;
 char **argv;
 {
 printf("Hello world!\n");
 }
</XMP>
```

---

## Notes

## Preformatting Sample

(continued)

```
<H2>Sample using <LISTING></H2>
```

```
<LISTING>
main(argc,argv)
int argc;
char **argv;
{
 printf("Hello world!\n");
}
</LISTING>
```

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jav/dk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/preformat.html>

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jav/dk

File Edit View Go Bookmarks Options Directory Window Help



Location: UNIFORM-TUTORIAL96/preformat.html

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## Different Preformatted Text Samples

### Sample using <PRE>

```
main(argc, argv)
int argc;
char **argv;
{
 printf("Hello world! \n");
}
```

### Sample using <XMP>

```
main(argc, argv)
int argc;
char **argv;
{
 printf("Hello world!\n");
}
```

### Sample using <LISTING>

```
main(argc, argv)
int argc;
char **argv;
{
 printf("hello world! \n");
}
```



## In-line Special Text

(not to be confused with special characters)

- The following elements exist for the rendering of special text
  - `<CODE>...</CODE>` is for source code fragments
  - `<KBD>...</KBD>` is for keyboard input samples
  - `<SAMP>...</SAMP>` is for a sequence of literal characters
  - `<VAR>...</VAR>` is for variable names (typically italic)
- All of these are not block and can be used in-line

---

## Notes

## In-line Sample

<H1>Tags for In-Line Special Text</H1>

Excerpt from <SAMP>group(5)</SAMP> man page description:

<PRE>

DESCRIPTION

The group file is a local source of group information. The group file can be used in conjunction with other group sources, including the NIS maps group.byname and group.bygid and the NIS+ table group. Programs use the getgrnam(3C) routines to access this information.

</PRE>

<P>The <CODE>newgrp</CODE> command logs a user into a new group by changing the user's real and effective group ID. For example, the user would type <KBD>newgrp staff</KBD> to log in to the group <VAR>staff<VAR>.

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/in-line.html>



Location: [/UNIFORM-TUTORIAL96/in-line.html]

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## Tags for In-Line Special Text

Excerpt from `group(5)` man page description:

### DESCRIPTION

The `group` file is a local source of group information. The `group` file can be used in conjunction with other group sources, including the NIS maps `group.byname` and `group.bygid` and the NIS+ table `group`. Programs use the `getgrnam(3C)` routines to access this information.

The `newgrp` command logs a user into a new group by changing the user's real and effective group ID. For example, the user would type `newgrp staff` to log in to the group `staff`.

## Schedule

- **HTML Authoring**
  - Formatting Directives**
  - List Structures**
  - Images and Multimedia**
  - Anchors and URLs**
  - Tricks of the Trade**
- **HTML Tables**
- **HTML Forms**
- **Late Breaking News**

---

## Notes

## Itemized Lists

- Several elements exist for creating different types of itemized lists
  - `<OL>...</OL>` is an ordered list (typically a numbered list)
  - `<UL>...</UL>` is an unordered list (typically a bullet list)
  - `<LI>` identifies the individual list items
- You can change the numbering of ordered lists (new for HTML 3.2)
  - `<OL START>` starts numbering ordered list
  - `<LI VALUE>` changes numbering of list item
- You can change the bullets of unordered lists (new for HTML 3.2)
  - `<UL TYPE>` and `<LI TYPE>` set the bullets for unordered lists

---

## Notes



## Itemized List Sample

<H1>Unordered List</H1>

Specifications:

<UL TYPE=SQUARE>

- <LI>Stall speed: 48 mph
- <LI>Rate of climb: 1300 fpm
- <LI>Service ceiling: 18,000 ft
- <LI>Range at 65% power: 820 sm

</UL>

<H1>Ordered List</H1>

Electrical Fire in Flight:

<OL START=3>

- <LI>Master Switch -- OFF
- <LI>Avionics Power Switch -- OFF
- <LI>All Other Switches -- OFF
- <LI>Vents/Cabin Air/Heat -- CLOSED
- <LI>Fire Extinguisher -- ACTIVATE

</OL>

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jsj/dlk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/itemlist.html>

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jsj/dlk

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Location: MUNIFORUM-TUTORIAL96/itemList.html

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## Unordered List

### Specifications:

- Stall speed: 48 mph
- Rate of climb: 1300 fpm
- Service ceiling: 18,000 ft
- Range at 65% power: 820 sm

## Ordered List

### Electrical Fire in Flight:

3. Master Switch -- OFF
4. Avionics Power Switch -- OFF
5. All Other Switches -- OFF
6. Vents/Cabin Air/Heat -- CLOSED
7. Fire Extinguisher -- ACTIVATE

## Definition Lists

- **Another element exists for creating definition-style lists**
  - <DL>...</DL> indicates a definition list**
    - Optional <DT COMPACT> attribute hints to browser that list is compact**
  - <DT> identifies the definition term**
    - Typically rendered on left third of page**
  - <DD> identifies the definition description**
    - Typically an indented paragraph adjacent to term**
    - If term is too long, definition may be rendered on next line**

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js.vdtk

---

## Notes

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js.vdtk

## Definition List Sample

```
<H1>Consider a standard definition list</H1>
<DL>
 <DT>v/so <DD>Stalling Speed or the minimum steady flight
 speed at which the airplane is controllable.
 <DT>v/ne <DD>Never Exceed Speed is the speed limit that
 may not be exceeded at any time.
</DL>

<H1>Versus a compact definition list:</H1>
<DL COMPACT>
 <DT>v/so <DD>Stalling Speed or the minimum steady flight
 speed at which the airplane is controllable.
 <DT>v/ne <DD>Never Exceed Speed is the speed limit that
 may not be exceeded at any time.
</DL>

<DL COMPACT>
 <DT>Note:
 <DD>the difference is browser dependent!
</DL>
```

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jsvdlk

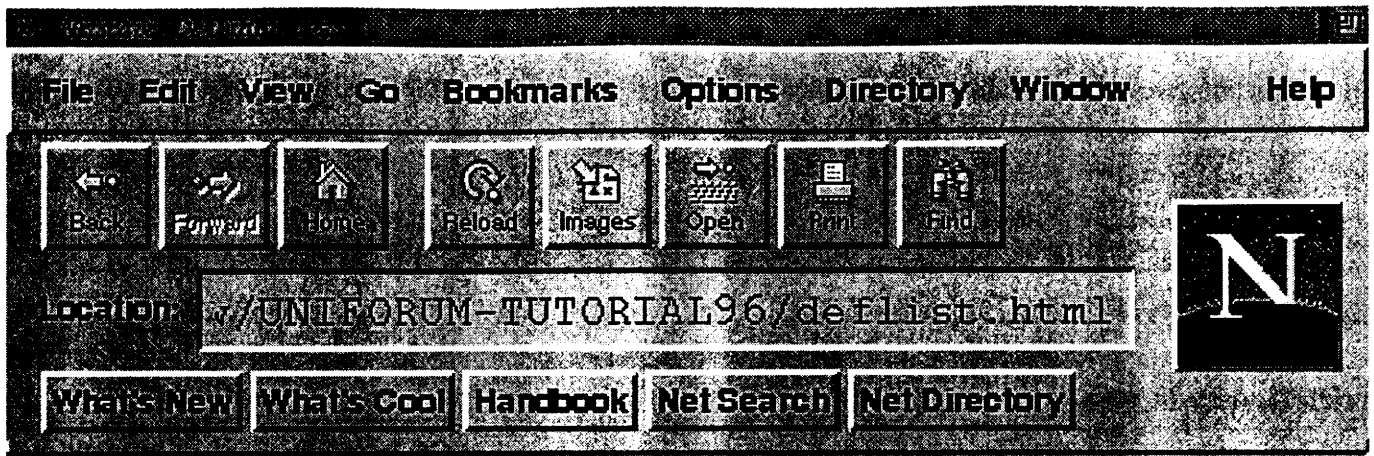
---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/deflist.html>

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## Consider a standard definition list

v/so

Stalling Speed or the minimum steady flight speed at which the airplane is controllable.

v/ne

Never Exceed Speed is the speed limit that may not be exceeded at any time.

## Versus a compact definition list:

v/so Stalling Speed or the minimum steady flight speed at which the airplane is controllable.

v/ne Never Exceed Speed is the speed limit that may not be exceeded at any time.

*Note:* the difference is browser dependent!



## Nesting of Lists

- All the list types can be nested and intermixed
  - Each nested level is rendered with different tags
  - Unordered lists vary among DISK | CIRCLE | SQUARE
  - Change with TYPE attribute
  - Ordered lists vary among 1-2-3, A-B-C, a-b-c, I-II-III and i-ii-iii
  - Change with TYPE=A|a|I|i|1 on <OL> and <LI>
- <DL> doesn't tend to change when nested
- Lists may also have block structures nested within them

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90/01

---

## Notes

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## Nesting Sample

<STRONG>Cessna 172 Preflight Inspection</STRONG>

<OL>

<LI>Cabin

<UL>

<LI>control lock - REMOVE

<LI>master switch - ON

<LI>fuel quantity - CHECK

<LI>flaps - FULL

<LI>master switch - OFF

</UL>

<LI>Left Fuselage

<UL>

<LI>chock - REMOVE

<LI>fuel sump - DRAIN

<LI>baggage door - LOCKED

<LI>integrity - CHECK

</UL>

<LI>...

</OL>

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js/dlk

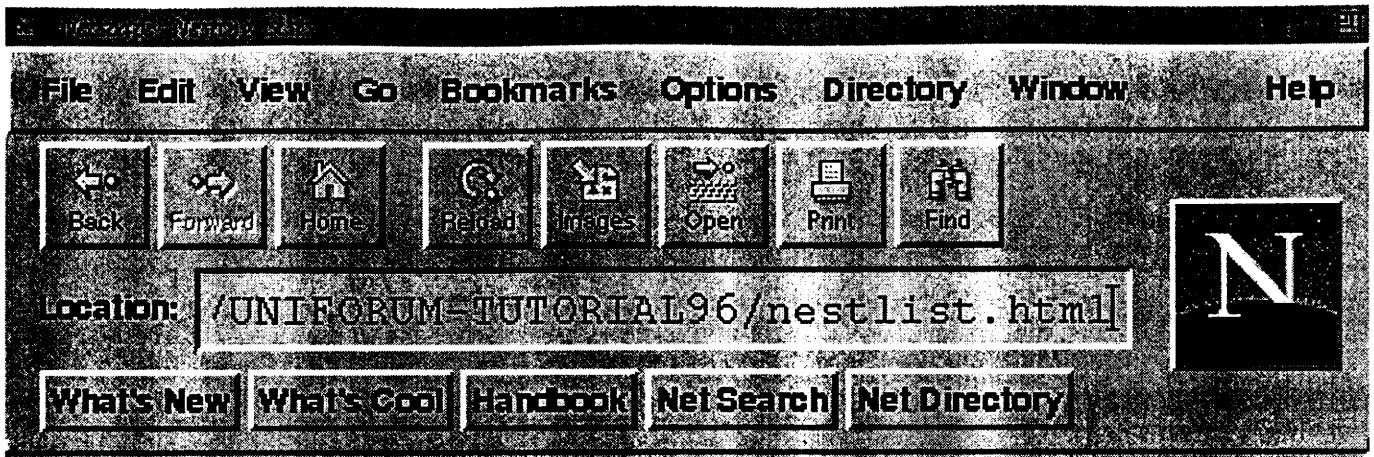
---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/nestlist.html>

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js/dlk



## Example of Nested Lists

### Cessna 172 Preflight Inspection

1. Cabin
  - control lock - REMOVE
  - master switch - ON
  - fuel quantity - CHECK
  - flaps - FULL
  - master switch - OFF
2. Left Fuselage
  - chock - REMOVE
  - fuel sump - DRAIN
  - baggage door - LOCKED
  - integrity - CHECK
3. Empennage
  - elevator - CHECK
  - rudder - CHECK
  - strobe - CHECK
  - tie down - REMOVE
4. ...





## Schedule

- **HTML Authoring**
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- **HTML Forms**
- **Late Breaking News**

---

## Notes

## Inserting In-line Images

- **Images may be inserted in-line using the <IMG SRC=URL> element**
  - SRC can be any URL (see <A>nchors for details)**
  - But may simply be the name of an image file**
  - GIF, XBM, XPM and JPEG formats supported by most browsers**
- **ALT="text" attribute associates text with image**
  - Optional, but recommended for non-graphical browsers**
  - Briefly describe what they're missing**
- **HTML 3.2 allows WIDTH= and HEIGHT= attributes**
  - Specifies dimensions of image in pixels**
  - Allows browser to preallocate space for image**
  - Browser may scale image if values differ from actual image**

---

## Notes

## Image Sample

(And boy, is it a trivial example)

```
<H1>Your Speaker</H1>
```

```
<IMG SRC="/~dlk/dave.gif" WIDTH=239 HEIGHT=315
ALT="Photo of your speaker's mug">
```

```
<IMG SRC="/~dlk/dave.gif" WIDTH=179 HEIGHT=243
ALT="Another photo of your speaker's mug">
```

<P>If you change the WIDTH and HEIGHT values to something other than those of the actual image, Netscape scales the image to fit the values you specified. Mosaic ignores it.

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jsvdlk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/image.html>

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jsvdlk


Netscape 3.02 (600x400)

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Location:

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## Your Speaker



If you change the WIDTH and HEIGHT values to something other than those of the actual image, Netscape scales the image to fit the values you specified. Mosaic ignores it.

## Image Alignment

- **The <IMG ALIGN> attribute controls where the image goes**  
ALIGN=TOP|MIDDLE|BOTTOM  
**Aligns image with respect to adjacent text**
- **HTML 3.2 allows additional image attribute alignment values**  
More ALIGN values (LEFT|CENTER|RIGHT)  
BORDER=x puts a border around image (in pixels)  
HSPACE=x VSPACE=y leaves space around image (in pixels)  
Netscape uses LOWSRC=URL to identify low resolution image to display
- **Normally text wraps around ALIGNED images in document**  
HTML 3.2 specifies the <BR CLEAR=LEFT|RIGHT|ALL> attribute  
**Breaks text to left, right or either side of image and picks up below**

---

## Notes

## Image Alignment Sample

(much more cool than the last sample)

```
<H1 ALIGN=CENTER>Cessna 172 For Sale</H1>
```

```
<IMG SRC="s172fwd.gif" ALT="C-172 Fwd View"
 BORDER=2 WIDTH=290 HEIGHT=115 ALIGN=RIGHT>
```

```
<P>This aircraft has been immaculately kept and exceptionally
maintained, never damaged, not a trainer or leaseback. Hours
accumulated by AT&T telegraph wire patrol. The aircraft is
parked at Fort Lauderdale Executive Airport. All specifications
are subject to verification by inspection.
```

```
<BR CLEAR=RIGHT>
```

*(continued next slide)*

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js/dk

---

## Notes

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js/dk

## Image Alignment Sample

(continued)

```
<IMG SRC="s172panel.gif" ALT="C-172 Panel"
 BORDER=2 WIDTH=290 HEIGHT=162 ALIGN=LEFT>
```

```
<DL>
```

```
<DT>Aircraft Total Time: <DD>4053 Hours
<DT>Time Since Overhaul: <DD>689 Hours
<DT>Annual Inspection: <DD>Apr 1996
<DT>Alt/Static Inspect: <DD>Dec 1996
<DT>ELT Battery: <DD>Oct 1996
```

```
</DL>
```

```
<BR CLEAR=LEFT>
```

For more information, or to see the aircraft in person,  
contact AT&T at Fort Lauderdale Executive Airport.

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---

## Notes

See: [http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/  
img-align2.html](http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/img-align2.html)

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js/dlk

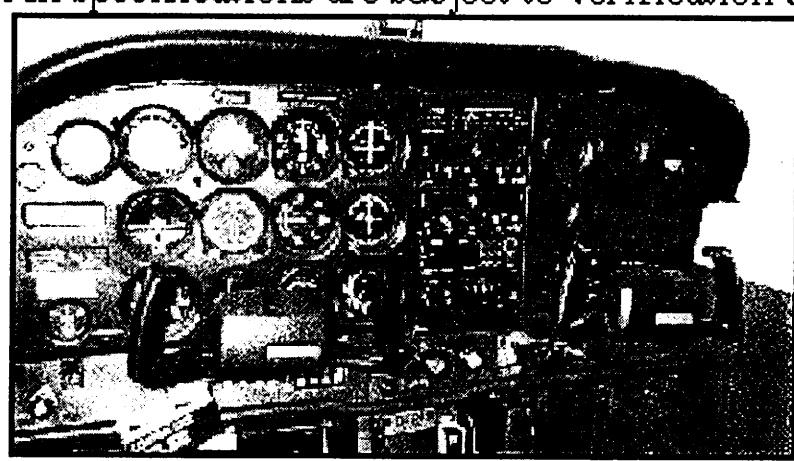
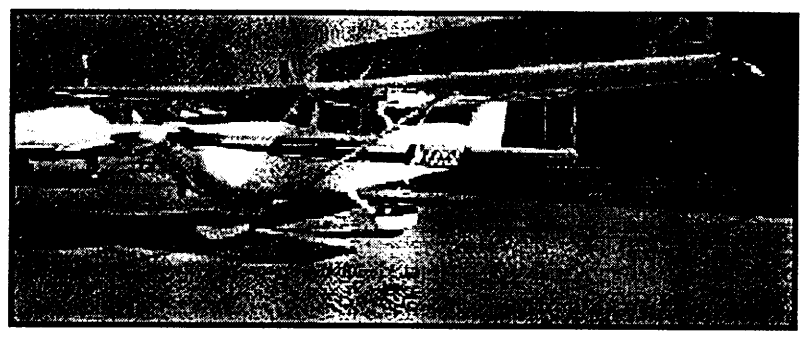


Location: [NTEGRUM-TUTORIAL96/img-align2.html]

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### Cessna 172 For Sale

This aircraft has been immaculately kept and exceptionally maintained, never damaged, not a trainer or leaseback. Hours accumulated by AT&T telegraph wire patrol. The aircraft is parked at Fort Lauderdale Executive Airport. All specifications are subject to verification by inspection.



Aircraft Total Time:  
4053 Hours  
Time Since Overhaul:  
689 Hours  
Annual Inspection:  
Apr 1996  
Alt/Static Inspect:  
Dec 1996  
ELT Battery:  
Oct 1996

For more information, or to see the aircraft in person, contact AT&T at Fort Lauderdale Executive Airport.



## Incorporating Other Formats

"So how do I put audio/movie/postscript/snorgle clips on my server?"

- **It's easy, just point an HREF anchor at the file**
- **Server determines what MIME Type is associated with the file**
  - Typically configured in mime.types file
  - Based on file extension
  - Configuration of servers is covered elsewhere
- **Browsers determine what to do with data based on MIME Type**
  - Browser displays file if it knows how
  - Can also be configured to call external viewer
  - Configuration of browsers is covered elsewhere
- **Adding a brand new type means modifying both server and browsers**

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ps/dtk

---

## Notes

**MIME == Multipurpose Internet Mail Extensions**

See RFCs 1521 and 1522 at <http://info.internet.isi.edu/in-notes/rfc/>.

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ps/dtk

## Multimedia Sample

<H2>Sound Clips</H2>

<UL>

- <LI><A HREF="sounds/Hasta.aiff">  
Arnold: Hasta La Vista</A>, 21954 bytes
- <LI><A HREF="sounds/X-Files.au">  
X-Files Theme</A>, 360470 bytes
- <LI><A HREF="sounds/broccoli.aiff">  
Clinton: No Broccoli</A>, 43298 bytes
- <LI><A HREF="sounds/monkeboy.aiff">  
Laugh While You Can, Monkeyboy!</A>, 20471 bytes
- <LI><A HREF="sounds/resist.aiff">  
Borg: Resistance Is Futile</A>, 31046 bytes
- <LI><A HREF="sounds/sally.aiff">  
When Harry Met Sally</A>, 303785 bytes
- <LI><A HREF="sounds/twilight.aiff">  
Twilight Zone Theme</A>, 197842 bytes
- <LI><A HREF="sounds/underdog.aiff">  
Underdog is Here</A>, 48704 bytes

</UL>

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js/djk

---

## Notes

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js/djk

## Multimedia Sample

(continued)

<H2>Movie Clips</H2>

I don't have any movies, but Disney makes the following Pocahontas production clips available:<P>

<UL>

<LI><A HREF="http://www.disney.com/media/BVPM/Pocahontas/Movies/ProdStory1.mov">

Introduction to Disney's Pocahontas</A>, 4.0 MByte

<LI><A HREF="http://www.disney.com/media/BVPM/Pocahontas/Movies/ProdStory2.mov">

Introduction to Disney's Animation process</A>, 3.3 MByte

<LI><A HREF="http://www.disney.com/media/BVPM/Pocahontas/Movies/ProdStory3.mov">

Video Referencing as a tool for animating</A>, 5.0 MByte

<LI>...

</UL>

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---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/media.html>

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Location: [www/UNIFORM-TUTORIAL96/media.html](http://www.UNIFORM-TUTORIAL96/media.html)

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## MultiMedia Examples

### Sound Clips

- [Arnold: Hasta La Vista](#), 21954 bytes
- [X-Files Theme](#), 360470 bytes
- [Clinton: No Broccoli](#), 43298 bytes
- [Laugh While You Can, Monkeyboy!](#), 20471 bytes
- [Borg: Resistance Is Futile](#), 31046 bytes
- [When Harry Met Sally](#), 303785 bytes
- [Twilight Zone Theme](#), 197842 bytes
- [Underdog is Here](#), 48704 bytes

### Movie Clips

I don't have any movies, but Disney makes the following Pocahontas production clips available:

- [Introduction to Disney's Pocahontas](#), 4.0 MByte
- [Introduction to Disney's Animation process](#), 3.3 MByte
- [Video Referencing as a tool for animating](#), 5.0 MByte
- [Research done for Disney's Pocahontas](#), 4.3 MByte
- [Introduction to Disney Animation](#), 2.1 MByte
- [Voice Talent for Disney's Pocahontas](#), 5.8 MByte
- [The music and the closing of Disney's Pocahontas](#), 5.5 MByte

## Schedule

- **HTML Authoring**
  - Formatting Directives**
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- **Late Breaking News**

---

## Notes

## **Anchors and Hyperlinks**

- **Hyperlinks are the structure used to link documents together**
  - <A>...</A> identifies a hyperlink anchor**
  - HREF attribute identifies the URL that the hyperlink references**
  - URLs are described shortly**
- **Text between <A> and </A> typically rendered colored and underlined**
- **HREF can reference another document entirely...**
  - Or can reference some other point in current document**
  - Or can reference some other resource altogether**

---

## **Notes**

## Anchor Sample

```
<H1>HTML/HTTP References</H1>
```

```
The
HyperNews pages at the
National Center for Supercomputing Applications (NCSA),
located at the University of
Illinois at Urbana-Champaign, has collected gobs of cool
information about HTML and HTTP. They have numerous references
regarding:
```

```

<A HREF="http://union.ncsa.uiuc.edu/HyperNews/get/www/html/
guides.html">
 HTML style guides
information on the
 <A HREF="http://union.ncsa.uiuc.edu:80/HyperNews/get/www/html/
lang.html">
 HTML language itself
```

---

## Notes

## Anchor Sample

(continued)

```
information on
 <A HREF="http://union.ncsa.uiuc.edu:80/HyperNews/get/www/html/
learning.html">
 learning HTML
references to
 <A HREF="http://union.ncsa.uiuc.edu:80/HyperNews/get/www/html/
editors.html">
 HTML editors
pointers to
 <A HREF="http://union.ncsa.uiuc.edu:80/HyperNews/get/www/html/
converters.html">
 HTML converters

```

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---

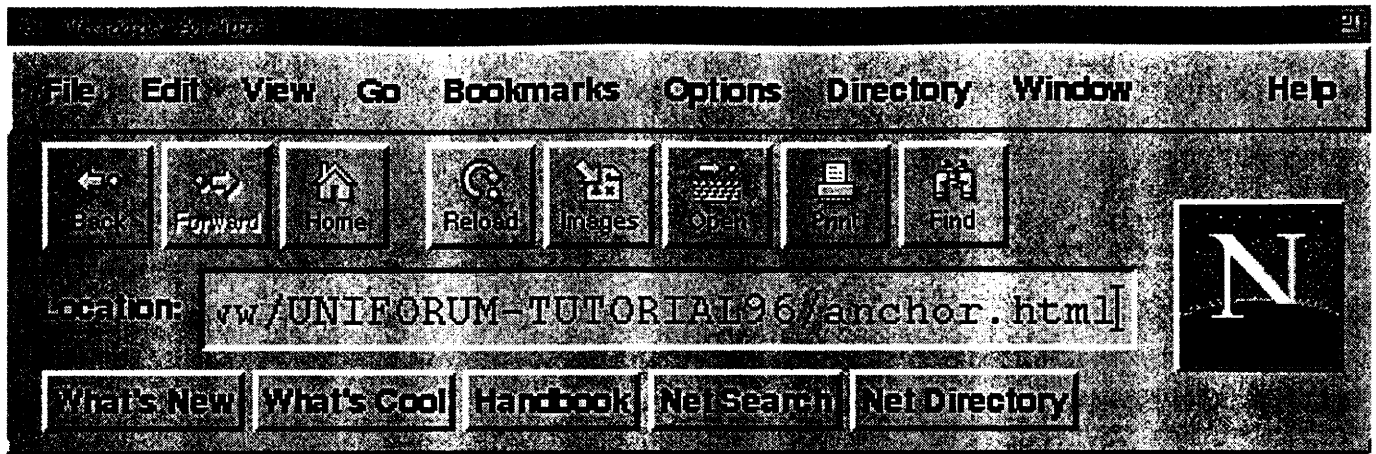
## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/anchor.html>

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## HTML/HTTP References

The HyperNews pages at the National Center for Supercomputing Applications (NCSA), located at the University of Illinois at Urbana-Champaign, has collected gobs of cool information about HTML and HTTP. They have numerous references regarding:

- HTML style guides
- information on the HTML language itself
- information on learning HTML
- references to HTML editors
- pointers to HTML converters



## Named Anchors

- **The anchor NAME attribute may be used to identify an anchor**
  - Associates the name with the anchor
  - Can then be referenced from an HREF anchor
- **Browser will display page starting at anchor**
  - Can be referenced within same document or from another document
- **Useful for building table of contents for long document**
- **Can be used alone or in conjunction with HREF anchor:**
  - `<A NAME="Here">`
  - `<A HREF="/foo/bar.html" NAME="Here">`

---

## Notes

## Named Anchors Sample

```
<H1 ALIGN=CENTER>Verses 1889-1896</H1>
<H3 ALIGN=CENTER>by Rudyard Kipling</H3>

TO WOLCOTT BALESTIER

To T.A.

DANNY DEEVER

TOMMY

"FUZZY-WUZZY"

...

<H2>TO WOLCOTT BALESTIER</H2>
...
<H2>To T.A.</H2>
...
<H2>DANNY DEEVER</H2>
...
<H2>TOMMY</H2>
...
<H2>"FUZZY-WUZZY"</H2>
...
```

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---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/named-anchors.html>

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Location: DRUM-TUTORIAL96/named-anchors.html

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## Verses 1889-1896

by Rudyard Kipling

Excerpted from Project Gutenberg's Etext of Verses 1889-1896 by Rudyard Kipling

TO WOLCOTT BALESTIER

To T.A.

DANNY DEEVER

TOMMY

"FUZZY-WUZZY"

...

## TO WOLCOTT BALESTIER

Beyond the path of the outmost sun through utter darkness hurled --  
 Further than ever comet flared or vagrant star-dust swirled --  
 Live such as fought and sailed and ruled and loved and made our world.

They are purged of pride because they died, they know the worth of their bays,  
 They sit at wine with the Maidens Nine and the Gods of the Elder Days,  
 It is their will to serve or be still as fitteth our Father's praise.

'Tis theirs to sweep through the ringing deep where Azrael's outposts are,  
 Or buffet a path through the Pit's red wrath when God goes out to war,  
 Or hang with the reckless Seraphim on the rein of a red-maned star.

They take their mirth in the joy of the Earth --  
 they dare not grieve for her pain --  
 They know of toil and the end of toil, they know God's law is plain,  
 So they whistle the Devil to make them sport who know that Sin is vain.

And ofttimes cometh our wise Lord God, master of every trade,  
 And tells them tales of His dailu toil of Edens newlu made.

## Anatomy of a URL

(What is this URL thing, anyway?)

- URL means Uniform Resource Locator

It uniquely identifies a resource on the Internet

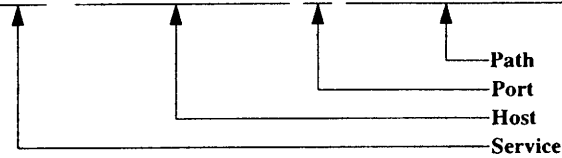
- Here's the complete format of a URL:

*service* : // [ [ *user* [ : *password* ] @ ] *host*\* ] [ : *port* ] ] / [ *path*\* ]

\* At least one of *host* or *path* must be present (depending on *service*)

- Here's the breakdown of a typical URL:

`http://www.nas.nasa.gov:80/NAS/TechReports/index.html`



- Service is one of: http, gopher, ftp, wais, news, mailto, telnet, file

---

## Notes

When the host portion is null, it implies the default

most URLs default to current host, ala:

`file://localhost/home/dlk/doc/phone.list`

news uses the news server configured in preferences; override with:

`news://cronkite.cisco.com/rec.humor.funny`

## URL Samples

- gopher://nic.cpuc.ca.gov:70/00/telecom/tele\_infra\_report
- ftp://ds.internic.net/rfc/rfc1738.txt
- wais://twilight.com:2229/freedom
- news:rec.humor.funny
- mailto:dlk@campus.mci.net
- telnet://namebase:guest@ursula.blythe.org
- file:/home/dlk/doc/phone.list (**Unix**)
- file:/C:/WINDOWS/WIN.INI (**DOS**)

---

## Notes

## Relative URLs

(Uncle Earl?)

- **HTML provide shortcuts to listing URLs in HTML source**
  - Provide only a portion of URL relative to current URL**
  - Browser will get missing information from URL of current document**
- **How the client builds absolute URL:**
  - If already viewing `http://www.xyz.org/path/file.html`**
  - And you select link defined by `<A HREF="another.html">`**
  - Client will start with `http://www.xyz.org/path/`**
  - And append `another.html`**
  - To build `http://www.xyz.org/path/another.html`**
- **Can also do things like `HREF="../dir/file.html"`**

---

## Notes

## Relative URL Samples

- **Given a base URL of...**  
`http://www.nasa.gov/info/index.html`
- **HREF="resources.html"**  
**becomes:** `http://www.nasa.gov/info/resources.html`
- **HREF="new/users.html"**  
**becomes:** `http://www.nasa.gov/info/new/users.html`
- **HREF="..clients/lynx.html"**  
**becomes:** `http://www.nasa.gov/clients/lynx.html`
- **HREF="/images/pluto.gif"**  
**becomes:** `http://www.nasa.gov/images/pluto.gif`

---

## Notes



# Frames

(Only in Netscape 2.x and beyond)

- **Divide a page into an arbitrary number of regions (frames)**
  - Each frame is independently scrollable**
  - Or can have scrolling feature disabled**
- **<FRAMESET> . . . </FRAMESET> tag replaces <BODY>**
  - COLS=x1 , x2 , x3 and ROWS=y1 , y2 , y3 define a grid of frames**
  - Values can be pixel widths, percentages, or "\*" (for remaining space)**
  - <FRAMESET>s can be nested (see sample)**
- **A <FRAME> tag describes each frame within a <FRAMESET>**
  - SRC="url" points to a normal HTML page to display in frame**
  - SCROLLING=YES|NO|AUTO controls scroll bars**
- **<NOFRAMES> . . . </NOFRAMES> provides HTML for non-frame browsers**

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ps/dlk

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/fsimp.html>

144

ps/dlk

## Frames Sample

(A simple sample)

```
<HTML>
<HEAD>
 <TITLE>Simple Frame Sample</TITLE>
</HEAD>

<FRAMESET COLS="50%,50%">
 <FRAMESET ROWS="33%,67%">
 <FRAME SRC="frame1.html">
 <FRAME SRC="frame2.html">
 </FRAMESET>
 <FRAMESET ROWS="150*,20%">
 <FRAME SRC="frame3.html">
 <FRAME SRC="frame4.html">
 <FRAME SRC="frame5.html">
 </FRAMESET>
</FRAMESET>
</HTML>
```

### frame1.html:

```
<HTML>
<TITLE>Frame 1</TITLE>
</HTML>

<BODY>
<CENTER>
<H1>This is frame 1</H1>
</CENTER>
</BODY>
</HTML>
```

---

## Notes

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Location: www/UNDEFORUM-TUTORIAL96/fsimp.html

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**This is frame 1**

**This is frame 3**

**This is frame 2**

**This is frame 4**

**This is frame 5**



## Another Frames Sample

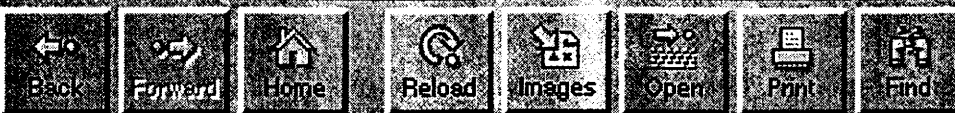
```
<HTML>
<HEAD>
 <TITLE>Frames</TITLE>
</HEAD>

<FRAMESET ROWS="70,*,66">
 <FRAME SRC="ftop.html" SCROLLING=NO>
 <FRAME SRC="fmid.html">
 <FRAME SRC="fbot.html" SCROLLING=NO>
</NOFRAMES>
 <H1>Frames Demo</H1>
 You are viewing a page that demonstrates the use of frames,
 but you are using a browser that does not know about frames.
 Currently, about the only browsers that understand frames are
 Navigator 2.x and beyond, available from
 Netscape Communications.
</NOFRAMES>
</FRAMESET>
</HTML>
```

---

## Notes

File Edit View Go Bookmarks Options Directory Window Help



Location: [www/UNIFORM-TUTORIAL96/frames.html](http://www.UNIFORM-TUTORIAL96/frames.html)

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CISCO SYSTEMS



# Cisco Connection ONLINE

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## Schedule

- **HTML Authoring**
  - Formatting Directives**
  - List Structures**
  - Images and Multimedia**
  - Anchors and URLs**
  - Tricks of the Trade**
- **HTML Tables**
- **HTML Forms**
- **Late Breaking News**

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jas/dlk

---

## Notes

**Remember to use the ALT attribute for text viewers, or you end up with something like  
{ IMAGE } in place of your colored line.**

154

jas/dlk

## Trendy Gimmicks

- **How do they make those bullet lists with colored balls?**

It's all done with mirror's, folks (no <UL> at all):

```
 General Information

```

```
 What's New

```

```
 Organization and Groups

```

```
 Projects

```

- **How do they make those rainbow colored lines?**

```

```

- **How do they make multi-color text?**

```
 General Information
```

---

## Notes

**Color attributes available in the <BODY> tag:**

**TEXT** changes primary text

**BACKGROUND** changes background

**LINK** changes unvisited links

**VLINK** changes visited links

**ALINK** changes active links (while you're clicking)

**Valid color names:**

aqua, black, blue, fuchsia, gray, green, lime, maroon, navy,  
olive, purple, red, silver, teal, white, yellow

## Trendy Gimmicks

(continued)

- **How do they make background wallpaper? Change background color?**  
`<BODY TEXT="#FF0000" BACKGROUND="world-small.gif">`  
`<BODY TEXT="red" BGCOLOR="black" LINK="green">`  
**Color attributes take standard colors or "#RRGGBB" values (red green blue)**  
**BACKGROUND attribute takes a URL**
- **Is my browser broken? I occasionally see text that winks on and off.**  
**No, it's not broken; Netscape introduced a ghastly <BLINK> tag.**  
`<BLINK>This might be more attractive if it blinked`  
`at a rate of something say 5 times faster</BLINK>`

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js/dlk

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/gimmicks.html>

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js/dlk



## Trendy Gimmicks

(continued)

- How about those funky font things?

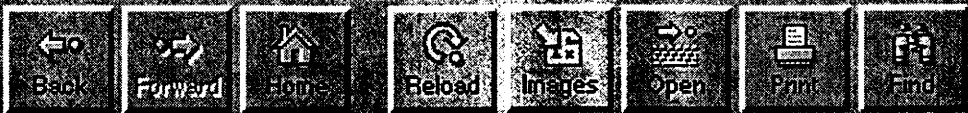
Another Netscape trick with <FONT SIZE>:

```
T
R
E
N
D
Y

G
I
M
M
I
C
K
S
```

---

## Notes



Location: UNIFORM-TUTORIAL96/gimmicks.html

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# TRENDY GIMMICKS

## Colored Ball Bullet Lists

- General Information
- What's New
- Organization and Groups
- Projects

## Rainbow Colored Lines

## Annoying Blink

This might be more attractive if it blinked at a rate of something say 5 times faster

## Counters

(How popular is my page anyway?)

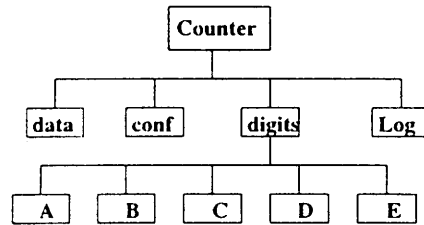
- **Count Version 2.3**
- **Available at** <http://www.fccc.edu/users/muquit/Count.html>
  - **Includes straight forward installation instructions**
- **Implemented as a CGI program -- not server include**
- **Easy to use -- defaults look OK**
  - **Lots of configuration options if you don't like defaults**
- **Supports several different character formats**
  - **Even extensible for the truly ambitious!**

---

## Notes

## Installing Count 2.0

- Obtain the source and follow installation instructions
- Installs `/cgi-bin/Count.cgi` binary
- Creates Counter heirarchy (in `/usr/local/etc` by default)



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javdk

---

## Notes

The Count 2.3 installation scripts are easy to use and have good descriptions, but here are a couple of notes you may find of interest while installing.

The config script only prompts for one alias (nickname). If your site has more (i.e. localhost), edit `count.cfg` and add manually.

**Do not** allow automatic file creation or anyone on the Internet can create files on your server!

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javdk

## Using Count 2.0

- `/cgi-bin/Count.cgi` outputs a GIF image  
Image composed of individual digits from `Count/digits dir`
- Set `<IMG SRC="URL">` to reference `/cgi-bin/Count.cgi`
- Add any applicable options (see next slide)  
Options are `&` delimited

---

## Notes

## Count 2.0 Options

- `df=file`      **set file name to store count**
- `dd=A-E`      **select digit directory A through E (different formats)**
- `ft=X`          **sets frame thickness to X**
- `frgb=R;G;B`   **sets frame color to RGB value**
- `tr=Y|N`       **turns GIF transparency on/off**
- `md=X`          **sets maximum number of digits (5 <= X <= 10)**
- `pad=Y|N`      **turn leading zero padding on/off (if md set)**
- `sh=Y|N`       **set whether to show counter or not**
- `incr=Y|N`     **set whether to increment counter or not**
- `st=X`          **start counting at X**
- `lit=X`         **display X instead of a counter**
- *Even more available; see documentation*

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/counters.html>

## Count 2.0 Samples

```
<H1>Some Samples of

Counter 2.0</H1>
```

```
<H2>Default Settings</H2>
This page has been accessed a total of

times.
```

```
<H2>Futzing With Borders</H2>
Total hits since January 1, 1996:
<IMG SRC="/cgi-bin/Count.cgi?df=counter2.dat&dd=C&md=5&ft=4
&frgb=255;210;0">
```

```
<H2>Dave's Personal Favorite</H2>
I clocked a total of

miles on my vacation to Yosemite.
```

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js/dlk

---

## Notes

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js/dlk

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Location: [WWW.FORUM-TUTORIAL96/counters.html](http://WWW.FORUM-TUTORIAL96/counters.html)

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## Some Samples of Counter 2.3

### Default Settings

This page has been accessed a total of **001290** times.

### Futzing With Borders

Total hits since January 1, 1996: **00145**

### Dave's Personal Favorite

I clocked a total of **531** miles on my vacation to Yosemite.



## Client Pull

- **Browser (client) refreshes (pulls) page at some interval**
  - Makes a slide show effect**
  - Often used by Web chat sites**
- **Implemented in <HEAD> using the <META> tag:**  
`<META HTTP-EQUIV="REFRESH" CONTENT="#; URL=URL">`
- **Causes browser to retrieve *URL* at # seconds**
  - URL* may be the same or different document**
  - Same document sets up infinite loop (open new *URL* to break)**
- **Note: with client pull, browser controls data flow**

---

## Notes

## Client Pull Sample

pull1.html

```
<HTML>
<HEAD>
 <TITLE>Client Pull</TITLE>
 <META HTTP-EQUIV="REFRESH" CONTENT="5; URL=pull2.html">
</HEAD>

<BODY>
<H1>Simple Client Pull Test</H1>
One!
</BODY>
</HTML>
```

177

pull1

---

## Notes

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pull1

## Client Pull Sample

pull2.html

```
<HTML>
<HEAD>
 <TITLE>Client Pull</TITLE>
 <META HTTP-EQUIV="REFRESH" CONTENT="5; URL=pull3.html">
</HEAD>

<BODY>
<H1>Simple Client Pull Test</H1>
Two!
</BODY>
</HTML>
```

179

pull2

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/pull1.html>

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pull1

## Client Pull Sample

pull13.html

```
<HTML>
<HEAD>
 <TITLE>Client Pull</TITLE>
 <META HTTP-EQUIV="REFRESH" CONTENT="5; URL=pull1.html">
</HEAD>

<BODY>
<H1>Simple Client Pull Test</H1>
Three!
</BODY>
</HTML>
```

181

js/dik

---

## Notes

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js/dik



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## Simple Client Pull Test

One!



## Server Push

- **Server sends multiple objects in data stream for a single object**
  - Typically used in `<IMG>` tags to make an in-line movie effect
  - Requires the use of CGI program
  - `<IMG SRC="/cgi-bin/send-file">`
- **Implemented by CGI sending multipart MIME type for object:**
  - Content-type: multipart/x-mixed-replace
- **Server thinks it's getting a simple image**
  - Instead it gets multiple images in same stream
  - Displays multiparts in same location on page
- **Note: with server push, server controls data flow**

---

## Notes

## Server Push Theory

- A typical data stream for an <IMG> reference might look like this:

```
Content-type: multipart/x-mixed-replace; boundary=separator
```

```
--separator
```

```
Content-type: image/gif
```

```
[[first image]]
```

```
--separator
```

```
Content-type: image/gif
```

```
[[second image]]
```

```
--separator
```

```
[[...and so forth...]]
```

```
--separator
```

```
Content-type: image/gif
```

```
[[last image]]
```

```
--separator--
```

---

## Notes

## Server Push Sample

push.html

```
<HTML>
<HEAD>
 <TITLE>Server Push</TITLE>
</HEAD>

<BODY>
<H1>Simple Server Push Test</H1>

<CENTER>

</CENTER>

</BODY>
</HTML>
```

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push.html

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/push.html>

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push.html



## Server Push: send-frames.pl

```
#!/usr/local/bin/perl

$BNDRY = "multipart-separator";
$DIR = "/usr/local/www/cgi-bin/dave";
@FILES = ("frame01.gif", "frame02.gif", "frame03.gif",
 "frame04.gif", "frame05.gif", "frame06.gif",
 "frame07.gif", "frame08.gif", "frame09.gif");

print "Content-type: multipart/x-mixed-replace; boundary=$BNDRY\n";
foreach $file (@FILES) {
 $file = "$DIR/$file";
 print "\n--$BNDRY\n";
 print "Content-type: image/gif\n\n";
 open(GIF, "<$file") ||
 die "$0: unable to open $file: $!\n";
 while (read(GIF, $buf, 16384))
 { print $buf; }
 close(GIF);
}
print "\n--$BNDRY--\n";
```

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ju/dk

---

## Notes

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ju/dk



Location: [http://www.UNIFORM-TUTORIAL96/push.html]

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# Simple Server Push Test



## Important Safety Tips

- **Remember that you're writing to different browsers**  
Test with several, including a text based one
- **List the size of large files you reference**  
Helps user decide if it's worth the wait to download
- **Consider using thumbnail images**  
Smaller images to refer to bigger images  
`<A HREF="f18.gif"><IMG SRC="f18-small.gif">F18</A>` (320 K)
- **Reuse graphics where possible**  
Modern browsers cache images
- **Check your pages for broken links, especially external links**

---

## Notes

## Style Guidelines

More of 'em

- **Don't use organizational structure if it changes frequently**  
Especially government agencies  
Or large phone companies :-)
- **Avoid using "click here" links**  
Instead, anchor the subject of the link
- **Avoid adding links to the previous page**  
All browsers have a back button that's more efficient  
Links to top level page are OK

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/compare2.html>

## **Bandwidth Saving Tips**

**Tips to make your docs load faster**

- **Use thumbnails**
- **Reuse images**
- **Use Interlaced images**
  - They don't really load faster, they just look that way**
- **Tips from the Bandwidth Conservation Society**
  - <http://www.infohiway.com/way/faster>
  - Reduce colormap depth and use dithering**
    - Default GIF is 8 bits deep (256 colors)**
    - Consider using 5 bits (32 colors) or even 4 bits (16 colors)**
    - Dithering attempts to retain clarity of deeper image**

---

## **Notes**

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Location: [/UNIFORM-TUTORIAL96/compare2.html]

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http://www.infohiway.com/way/faster

4 bits/16 colors

**Bandwidth Conservation Society / Tutorial / Comparison Number 2**

**JPEG Source File / 25,874 Bytes**

For comparison, we've included the source file in JPEG format. The image was originally designed and rendered with KPT Bryce as a Macintosh PICT file. It was then opened and saved using GIF Converter. The JPEG options were set to No Compression and Millions of Colors.



**5-Bit GIF, Adaptive Palette / 7,554 Bytes**

This image was opened and saved using Adobe Photoshop (v2.5.1). The original PICT was converted to 5-Bit Indexed Color using an Adaptive Palette, No Diffusion. The flattening (posterization) of the colors (in the shadow areas and in the sky), is a modest cost when compared to the massive decrease in bytesize.



# Authoring Techniques

## Techniques for editing documents

- **The manual method**
  - Edit the source file with your favorite editor
  - Select "Reload" in your browser
  - Go to step 1
- **WYSIWYG editors**
  - Covered elsewhere
- **Remember View Source**
  - If you find something you like, see how the author did it

---

## Notes

## Schedule

- HTML Authoring
- HTML Tables
- HTML Forms
- Late Breaking News

205

js/dtk

---

## Notes

**Tables were introduced in HTML 3.0 and redefines in HTML 3.2**  
**Netscape's BORDER uses 3-D look, Mosaic's uses plain lines**

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js/dtk



## Overview of Tables

- **HTML 3.2 specifies tables**
- **Netscape and Mosaic have different implementations**
  - Because of inconsistencies, expect to do lots of edit/reload
- **Basic table construction:**
  - `<TABLE>...</TABLE>` defines the table
    - Attribute `BORDER` turns borders between cells on
  - `<CAPTION>...</CAPTION>` associates a caption with the table
  - `<TR>` identifies each table row
    - `<TH>` identifies cells within the row as table headings
    - `<TD>` identifies cells within the row as table data
- **Use whitespace to make reading tables easy**
- **Note: `<CAPTION>` doesn't work in Mosaic 2.7b5**

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jsv/dlk

---

## Notes

208

jsv/dlk

## Simple Table Sample

```
<TABLE>
 <CAPTION> Title </CAPTION>
 <TR><TH> Heading <TH> Heading <TH> Heading
 <TR><TD> Cell <TD> Cell <TD> Cell
 <TR><TD> Cell <TD> Cell <TD> Cell
 <TR><TD> Cell <TD> Cell <TD> Cell
</TABLE>
```

210

jsu/dlk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/table1.html>

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jsu/dlk

## Table Sample with Borders

```
<TABLE BORDER>
 <CAPTION> Title </CAPTION>
 <TR><TH> Heading <TH> Heading <TH> Heading
 <TR><TD> Cell <TD> Cell <TD> Cell
 <TR><TD> Cell <TD> Cell <TD> Cell
 <TR><TD> Cell <TD> Cell <TD> Cell
</TABLE>
```

---


## Notes

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Location: [www / UNIFORUM-TUTORIAL96 / table1.html](http://www.UNIFORUM-TUTORIAL96/table1.html)

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## Table Without Borders

Title

Heading	Heading	Heading
Cell	Cell	Cell
Cell	Cell	Cell
Cell	Cell	Cell

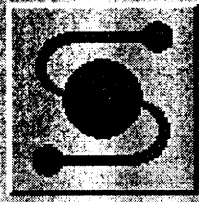
## Table With Borders

Title

Heading	Heading	Heading
Cell	Cell	Cell
Cell	Cell	Cell
Cell	Cell	Cell

Title: Simple Table Samples

URL: [ons/www/uni/forum-tutorial-96/table1.html](http://ons/www/uni/forum-tutorial-96/table1.html)



## Table Without Borders

Heading	Heading	Heading
Cell	Cell	Cell
Cell	Cell	Cell
Cell	Cell	Cell

## Table With Borders

Heading	Heading	Heading
Cell	Cell	Cell
Cell	Cell	Cell
Cell	Cell	Cell



Back

Forward

Home

Reload

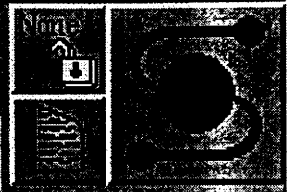
Open

Save As...

Clone

New

Close



## Table Without Borders

Title

Heading Heading Heading

Cell Cell Cell

Cell Cell Cell

Cell Cell Cell

## Table With Borders

Title

Heading Heading Heading

Cell Cell Cell

Cell Cell Cell

Cell Cell Cell

## Table Alignment

- **Data in cells can be aligned horizontally**
  - ALIGN=LEFT|CENTER|RIGHT attribute works on <TR> <TH> and <TD>
  - <TR ALIGN> affects all cells in that row
  - <TH ALIGN> and <TD ALIGN> only affect single cells
- **Data in cells can be aligned vertically**
  - VALIGN=TOP|MIDDLE|BOTTOM also applies to <TR> <TH> and <TD>
- **Caption can be aligned too**
  - <CAPTION ALIGN=TOP|BOTTOM|LEFT|RIGHT> per HTML 3.2
- **Warnings:**
  - Neither ALIGN nor VALIGN works with <TR> in Mosaic 2.7b5
  - Netscape 2.2 supports <CAPTION ALIGN=TOP> and <...BOTTOM> only
  - Captions are completely broken in Mosaic
  - Beware of whitespace - older versions of Mosaic include it in centering calculations

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jmw/dlt

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/table2.html>

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jmw/dlt

## Alignment Sample

```
<TABLE BORDER>
 <TR><TD ALIGN=LEFT> NW <TD ALIGN=CENTER> N <TD ALIGN=RIGHT> NE
 <TR><TD ALIGN=LEFT> W <TD ALIGN=CENTER> Here <TD ALIGN=RIGHT> E
 <TR><TD ALIGN=LEFT> SW <TD ALIGN=CENTER> S <TD ALIGN=RIGHT> SE
</TABLE>
```

---

## Notes



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Location: [http://www.uniforum-tutorial96/table2.html](#)

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## Cell Alignment

NW	N	NE
W	Here	E
SW	S	SE

*Note:*

Certain browsers count white space within cells for determining alignment formatting. For uniform results, do not include extra white space within <ALIGN>ed cells.

## Spanning Table Columns and Rows

Now we get to the meaty stuff

- **Attributes exist to allow spanning columns and rows**
  - COLSPAN=xx specifies how many columns the current cell should span
  - ROWSPAN=yy specifies how many rows the current cell should span
- **Means a cell occupies the space of more than just one cell**
- **Can be applied to both <TH> and <TD> elements**

---

## Notes

## Meaty Table Sample

<H1>Practical Table Sample</H1>

This sample illustrates most of the features of tables.<p>

```
<TABLE BORDER>
 <CAPTION> Cruise Performance of Cessna 182 </CAPTION>

 <!-- First header line -->
 <TR>
 <TH COLSPAN=2>
 <TH COLSPAN=3> 20 Degrees Below Standard
 <TH COLSPAN=3> Standard Temperature
 <TH COLSPAN=3> 20 Degrees Above Standard

 <!-- Second header line -->
 <TR>
 <TH> RPM <TH> MP
 <TH> BHP <TH> KTAS <TH> GPH
 <TH> BHP <TH> KTAS <TH> GPH
 <TH> BHP <TH> KTAS <TH> GPH
```

---

## Notes

## Meaty Table Sample

(continued)

```
<!-- First data line -->
<TR ALIGN=CENTER>
 <TD ROWSPAN=4> 2400 <TD> 22
 <TD> 77 <TD> 134 <TD> 13.1
 <TD> 74 <TD> 135 <TD> 12.6
 <TD> 71 <TD> 136 <TD> 12.2

<!-- Second data line -->
<!-- note cell 1 missing because of ROWSPAN above -->
<TR ALIGN=CENTER>
 <TD> 21
 <TD> 72 <TD> 131 <TD> 12.3
 <TD> 69 <TD> 132 <TD> 11.8
 <TD> 66 <TD> 133 <TD> 11.4
```

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/table3.html>

## Meaty Table Sample

(completed)

```
<!-- Third data line -->
<TR ALIGN=CENTER>
 <TD> 20
 <TD> 67 <TD> 128 <TD> 11.5
 <TD> 65 <TD> 128 <TD> 11.1
 <TD> 63 <TD> 129 <TD> 10.7

<!-- Fourth data line -->
<TR ALIGN=CENTER>
 <TD> 19
 <TD> 62 <TD> 124 <TD> 10.7
 <TD> 60 <TD> 124 <TD> 10.3
 <TD> 58 <TD> 125 <TD> 10.0
</TABLE>
```

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js/dk

---

## Notes

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js/dk

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Location: [www/UNIFORUM-TUTORIAL96/table3.html](http://www.UNIFORUM-TUTORIAL96/table3.html)

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## Practical Table Sample

This sample illustrates most of the features of tables.

Cruise Performance of Cessna 182

		20 Degrees Below Standard			Standard Temperature			20 Degrees Above Standard		
RPM	MP	BHP	KTAS	GPH	BHP	KTAS	GPH	BHP	KTAS	GPH
2400	22	77	134	13.1	74	135	12.6	71	136	12.2
	21	72	131	12.3	69	132	11.8	66	133	11.4
	20	67	128	11.5	65	128	11.1	63	129	10.7
	19	62	124	10.7	60	124	10.3	58	125	10.0

Address bar:   

## Schedule

- HTML Authoring
- HTML Tables
- HTML Forms
  - Text Input
  - Buttons
  - Selection Lists
  - Paragraph Input
- Late Breaking News

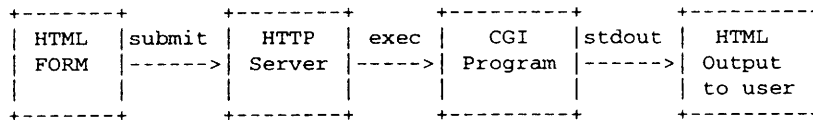
---

## Notes

## Forms and CGI

A brief introduction to forms and the Common Gateway Interface

- **Forms supply a mechanism to provide input to HTTP server**
- **CGI provides an interface from server to an external program**  
External program runs on server, not client
- **Program flow**  
User fills out HTML form and submits it to server  
Server packages user data, execs CGI program  
CGI program parses users data and generates HTML output



---

## Notes



## HTML Forms

- **Let's start with building the HTML form**
- **A form is delimited with <FORM>...</FORM>**
- **Attribute ACTION="URL" identifies resource to invoke**
  - ACTION="/cgi-bin/program" identifies CGI program to invoke**
  - ACTION="mailto:user@host.dom" mails data to address**
- **Attribute METHOD=POST|GET defines method of communication to server**
- **POST means (preferred method)**
  - Browser sends data to server in message body**
  - Server sends data to CGI via stdin**
- **GET means**
  - Browser sends data to server encoded in URL**
  - Server sends data to CGI in QUERY\_STRING env var**
- **We'll discuss the difference in detail later**

---

## Notes

## More About Forms

- **CGI programs publicly available to test your form:**
  - POST:** <http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query>
  - GET:** <http://hoohoo.ncsa.uiuc.edu/htbin/query>
- **About the only thing you can't have in a <FORM> is another <FORM>**
  - I.e. no nesting of forms**
- **But you can have multiple forms in a document**

---

## Notes

## Form Sample

```
<FORM ACTION="/cgi-bin/pacify.pl" METHOD=POST>
 Text and elements defining form and such goes here.
 This sample sends no data to CGI program, but it would
 invoke pacify.pl without data if we had a Submit
 button. 'Course, we don't learn about submit buttons
 for a couple more slides. :-)
</FORM>
```

---

## Notes

## Schedule

- HTML Authoring
- HTML Tables
- HTML Forms
  - Text Input
  - Buttons
  - Selection Lists
  - Paragraph Input
- Late Breaking News

---

## Notes

## Text Input

- The <INPUT> element is used to do most data input to CGI programs
- The TYPE=xxx attribute identifies the type of the input field
- Takes one of numerous values for each <INPUT> element:  
TEXT | PASSWORD | CHECKBOX | RADIO | SUBMIT | RESET | IMAGE | HIDDEN
- The NAME="yyy" attribute associates a name with input field  
CGI program uses yyy to reference data from field
- Text input is done with TYPE=TEXT input fields  
Label the field prior to <INPUT> tag

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/riddle.html>

## Text Input Sample

```
<HTML>
<HEAD>
 <TITLE>Silly Riddle</TITLE>
</HEAD>

<BODY>

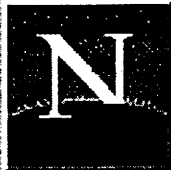
<FORM>
 <H1>A Silly Riddle</H1>
 What did the Pink Panther say when he stepped on
 an ant?
 <INPUT TYPE=TEXT NAME="answer">
</FORM>

</BODY>
</HTML>
```

---

## Notes

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Location: [http://WWW.UNIFORM-TUTORIAL96/riddle.html]

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## A Silly Riddle

What did the Pink Panther say when he stepped on an ant?

## More About Text Input

- **Other attributes can be used with TYPE=TEXT input**
- **The VALUE="zzz" attribute allows you to preset the field**  
**It's prefilled with "zzz" but the user can change it**
- **The SIZE=n attribute specifies how big input area is (in chars)**  
**User can type more characters -- field scrolls horizontally**  
**Default is usually around 20**
- **The MAXLENGTH=n attribute sets the absolute length of field**  
**No more than MAXLENGTH chars can be input**  
**Even with scrolling fields**
- **Setting MAXLENGTH and SIZE to same value prohibits input scrolling**  
**Fixes field length at that value**  
**Typically beeps on attempt to enter more chars**

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js/dlk

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/text.html>

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js/dlk



## Useful Input Sample

Well, almost...

```
<H1>Example of Text Input</H1>
<FORM>
 Name:
 <INPUT TYPE=TEXT NAME="Last" SIZE=25 MAXLENGTH=25> ,
 <INPUT TYPE=TEXT NAME="First" SIZE=20 MAXLENGTH=20>
 <INPUT TYPE=TEXT NAME="MI" SIZE=1 MAXLENGTH=1>
 Last, First MI

 Address:
 <INPUT TYPE=TEXT NAME="Addr" SIZE=40 MAXLENGTH=40>

 City, ST, ZIP:
 <INPUT TYPE=TEXT NAME="City" SIZE=20 MAXLENGTH=20> ,
 <INPUT TYPE=TEXT NAME="State" SIZE=2 MAXLENGTH=2> ,
 <INPUT TYPE=TEXT NAME="Zip" SIZE=9 MAXLENGTH=14>
 ZIP+4 OK

 Phone Number:
 <INPUT TYPE=TEXT NAME="Something" SIZE=12 MAXLENGTH=12>
 Eg: 415-555-1212
</FORM>
```

---


## Notes

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Location: /www/UNIFORM-TUTORIAL96/text.html

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## Example of Text Input

Name:  ,  *Last, First MI*

Address:

City, ST, ZIP:  ,  ,  *ZIP+4 OK*

Phone Number:  *Eg: 415-555-1212*

## Password Input

- The TYPE=PASSWORD attribute is very similar to TYPE=TEXT  
Allows text entry, but prints \*'s for each char you type
- Uses same attributes as TYPE=TEXT in last slide
- Can be used for any data -- need not be a password
- **WARNING:** While the password does not echo to the screen, the password transmitted to server is in clear text and susceptible to sniffing and interception. Do not use for highly secure applications!

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/password1.html>

## Password Sample

<H1>Example of Password Input</H1>

```
<DL COMPACT>
<DT>NOTE:
<DD>You are about to access restricted information.
 Access beyond this point requires user authentication.
 Please enter your username and password to continue.
</DL>

<FORM>
 Username:
 <INPUT TYPE=TEXT NAME="Username" SIZE=8>

 Password:
 <INPUT TYPE=PASSWORD NAME="Password" SIZE=8>

</FORM>
```

---

## Notes

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## Example of Password Input

**NOTE:**

You are about to access restricted information. Access beyond this point requires user authentication. Please enter your username and password to continue.

Username:

Password:

## Schedule

- HTML Authoring
- HTML Tables
- HTML Forms
  - Text Input
  - Buttons
  - Selection Lists
  - Paragraph Input
- Late Breaking News

---

## Notes

## Submitting Input

- So how do we get all this form data to the server?
- Each `<FORM>` needs at least an `<INPUT TYPE=SUBMIT>`
  - Creates a "Submit Query" button
- Pressing button sends any data on form to the server
  - Button itself has no data associated with it
- The `VALUE="text"` attribute allows you override default label
  
- Another useful `<INPUT>` button is `TYPE=RESET`
  - Creates a "Reset" button to clear form to defaults
- `VALUE="text"` works here, too.

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js@dlk

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/password2.html>

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js@dlk

## A Sample That Really Works

```
<H1>Example of Password Input</H1>

<DL COMPACT>
<DT>NOTE:
<DD>You are about to access restricted information.
 Access beyond this point requires user authentication.
 Please enter your username and password to continue.
</DL>

<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
 Username:
 <INPUT TYPE=TEXT NAME="Username" SIZE=8>

 Password:
 <INPUT TYPE=PASSWORD NAME="Password" SIZE=8>

 <INPUT TYPE=SUBMIT VALUE="Authenticate!">
 <INPUT TYPE=RESET VALUE="Start Over">
</FORM>
```

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jsvdlk

---

## Notes

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jsvdlk



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Location: UNIFORM-TUTORIAL96/password2.html

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## Example of Password Input

**NOTE:**

You are about to access restricted information. Access beyond this point requires user authentication. Please enter your username and password to continue.

Username:

Password:

## Checkbox Inputs

- **Checkbox builds a list of selections to check: TYPE=CHECKBOX**
- **User can check off any or all of the items**
- **Create <INPUT TYPE=CHECKBOX> for each check item on list**
  - Group the items in list by using common NAME=xxx attributes**
  - Distinguish items in list by using different VALUE=yyy attributes**
- **Default is unchecked; override with CHECKED attribute**

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js/dtk

---

## Notes

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js/dtk

## CGI Input From Checkbox

- **For each item checked, NAME gets set to VALUE**  
I.e. if user checks following box:  
`<INPUT TYPE=CHECKBOX NAME="FontStyle" VALUE="Bold">`  
Then CGI will receive `FontStyle=Bold` in input
- **If multiple items created with NAME="FontStyle",**  
CGI can receive multiple `FontStyle=xxx` in input:  
`FontStyle=Bold`  
`FontStyle=Italic`

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js/dk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/checkbox.html>

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js/dk

## Checkbox Sample

```
<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
 <H2>Build a directory listing (<KBD>ls</KBD>) command</H2>
 Select the options you desire:

 <INPUT TYPE=CHECKBOX NAME="Opts" VALUE="-a">
 list all files

 <INPUT TYPE=CHECKBOX NAME="Opts" VALUE="-C" CHECKED> -
 use multi-column output

 <INPUT TYPE=CHECKBOX NAME="Opts" VALUE="-d">
 list directories by name

 <INPUT TYPE=CHECKBOX NAME="Opts" VALUE="-F">
 annotate file types by adding a suffix

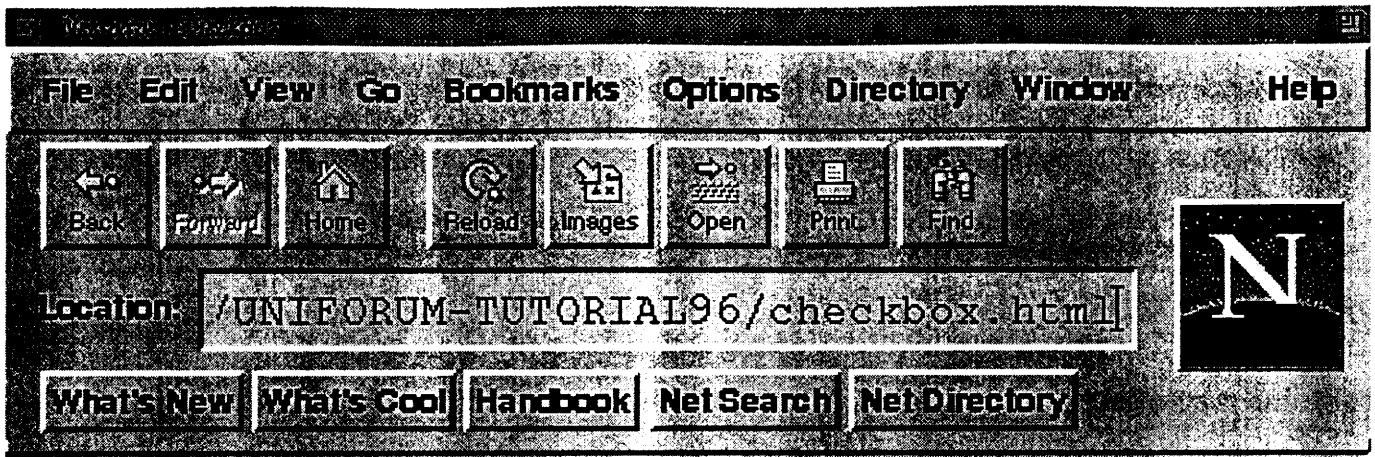
 <INPUT TYPE=CHECKBOX NAME="Opts" VALUE="-l">
 display in long, detailed output

 <INPUT TYPE=CHECKBOX NAME="Opts" VALUE="-R">
 recursively list subdirectories

 ...
 <INPUT TYPE=SUBMIT VALUE="Issue Command">
 <INPUT TYPE=RESET VALUE="Reset Options">
</FORM>
```

---

## Notes



## Example of Checkbox Input

### Build a directory listing (ls) command

Select the options you desire:

- list all files
- use multi-column output
- list directories by name
- annotate file types by adding a suffix
- display in long, detailed output
- recursively list subdirectories
- sort by time stamp instead of name



## Radio Button Inputs

- Radio buttons allow selection of one of a list of items: TYPE=RADIO
- User can check only one item; checking another resets the first
- Create <INPUT TYPE=RADIO> for each check item on list
  - Group the items in list by using common NAME=xxx attributes
  - Distinguish items in list by using different VALUE=yyy attributes
- Default is unchecked; override with CHECKED attribute (only one)

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js/dtk

---

## Notes

**Caution:** Errant scripts or unscrupulous individuals could send more than one Name=Value pair for a radio button.

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js/dtk

## CGI Input From Radio Buttons

- For the item checked, NAME gets set to VALUE

I.e. if user checks following box:

```
<INPUT TYPE=RADIO NAME="FontSize" VALUE="10">
```

Then CGI will have FontSize=10 in input

- Since only one item in a list can be checked  
CGI will only receive one FontSize=xxx in input

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js/dlx

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/radio.html>

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js/dlx

## Radio Button Sample

```
<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
 <H2>The Beatles</H2>
 Select the song you wish to hear:

 <INPUT TYPE=RADIO NAME="Tune" VALUE="Hard">
 A Hard Day's Night

 <INPUT TYPE=RADIO NAME="Tune" VALUE="Sub">
 Yellow Submarine

 <INPUT TYPE=RADIO NAME="Tune" VALUE="Long">
 The Long and Winding Road

 <INPUT TYPE=RADIO NAME="Tune" VALUE="Rev">
 Revolution

 <INPUT TYPE=RADIO NAME="Tune" VALUE="Etc1">
 Etc

 <INPUT TYPE=RADIO NAME="Tune" VALUE="Etc2">
 Etc

 <INPUT TYPE=RADIO NAME="Tune" VALUE="Etc3">
 Etc

 <INPUT TYPE=SUBMIT VALUE="Play">
</FORM>
```

---

## Notes



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## Example of Radio Button Input

### The Beatles

Select the song you wish to hear:

- A Hard Day's Night
- Yellow Submarine
- The Long and Winding Road
- Revolution
- Etc
- Etc
- Etc

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## Example of Radio Button Input

### The Beatles

Select the song you wish to hear:

- A Hard Day's Night
- Yellow Submarine
- The Long and Winding Road
- Revolution
- Etc
- Etc
- Etc

Play

## Hidden Input

- You can create a "stealth" <INPUT> field that the browser does not render
- Use <INPUT TYPE=HIDDEN> and it will not show up on the screen
  - Also needs a NAME=xxx and/or VALUE=yyy to be useful
- Supplied as input to CGI program just as any other <INPUT>
  - Using NAME and VALUE you specify
- Can be used to convey "state" information
- Note: not really very stealthy
  - View source will reveal the field

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ju/dlk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/hidden.html>

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ju/dlk

## Hidden Sample

```
<H1>Example of Hidden Input</H1>
```

```
<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
```

```
<H2>Computer Science 134</H2>
```

```
Computer Science 134 is an introductory algorithms class,
where the student will learn various sorting algorithms,
including bubble, quick and shell sorts; searching algorithms,
including string and regular expression searches; and binary
tree traversal algorithms, including prefix, infix and postfix.<P>
```

```
<INPUT TYPE=SUBMIT VALUE="Register"> for CS-134
```

```
<INPUT TYPE=HIDDEN NAME="form" VALUE="cs134">
```

```
<INPUT TYPE=HIDDEN NAME="student" VALUE="Joe Student">
```

```
</FORM>
```

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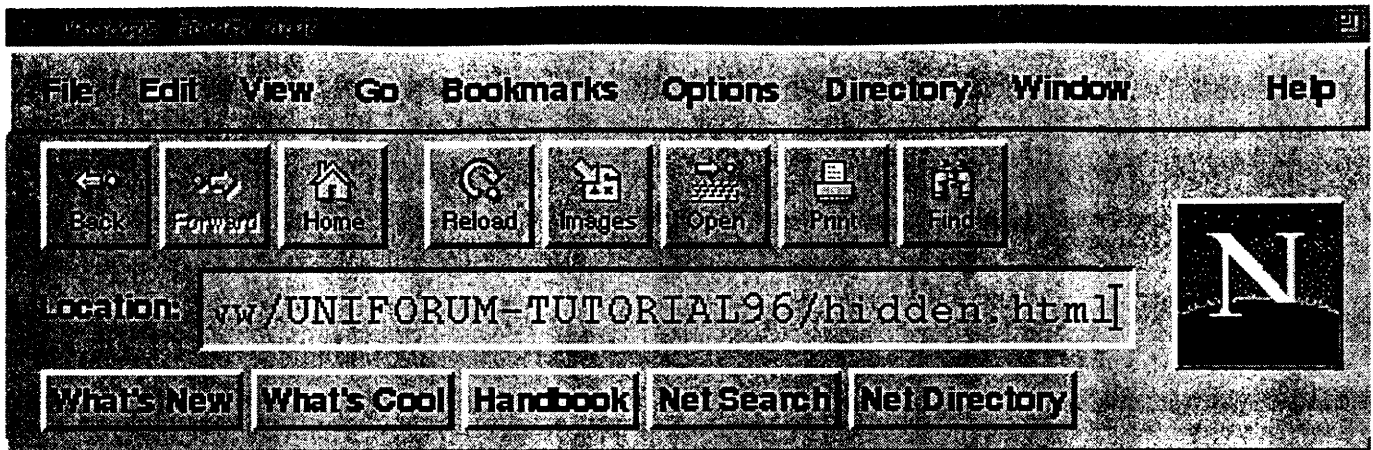
ms/dk

---

## Notes

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ms/dk



## Example of Hidden Input

### Computer Science 134

Computer Science 134 is an introductory algorithms class, where the student will learn various sorting algorithms, including bubble, quick and shell sorts; searching algorithms, including string and regular expression searches; and binary tree traversal algorithms, including prefix, infix and postfix.

[Register](#) for CS-134



## Schedule

- **HTML Authoring**
- **HTML Tables**
- **HTML Forms**
  - Text Input**
  - Buttons**
  - Selection Lists**
  - Paragraph Input**
- **Late Breaking News**

---

## Notes

## Selection Lists

- **Forms have a mechanism to select an option (or multiple options) from a list**
- **<SELECT>...</SELECT> delimits the list**
- **NAME identifies the list**
- **SIZE tells how many options to display**
  - **Scroll region if more than SIZE defined**
  - **Pop up menu if no SIZE specified (browser specific)**
- **MULTIPLE allows multiple options to be selected**
  - **Overrides pop up menu**
- **<OPTION> identifies the options in the list**
  - **Text following <OPTION> is the actual option**
- **VALUE attaches a value to the option**
  - **CGI will receive NAME=VALUE**
  - **If no VALUE, default is to use text following <OPTION>**

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jsv/dlk

---

## Notes

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jsv/dlk

## Selection Sample

(Using VALUES)

```
<H1>Example of Select Tab</H1>

<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
 <H2>What do you wish to do?</H2>

 <SELECT NAME="code">
 <OPTION VALUE="New">New User Form
 <OPTION VALUE="Add">Local Database Add
 <OPTION VALUE="Upd">Local Database Update
 <OPTION VALUE="Del">Local Database Delete
 <OPTION VALUE="Src" SELECTED>Local Database Search
 <OPTION VALUE="Act">Concurrent Log-in Search (U/C)
 <OPTION VALUE="Adm">Administer User List
 </SELECT>

 <INPUT TYPE=SUBMIT>
</FORM>
```

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jsv/dlk

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/select.html> for a sample with VALUE

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/select-no-value.html> for a sample without VALUE

**(The above two look identical, but the data sent to the server differs.)**

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jsv/dlk



## Selection Sample

(Without VALUES)

```
<H1>Example of Select Tab</H1>

<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
 <H2>What do you wish to do?</H2>

 <SELECT NAME="code">
 <OPTION VALUE="New">New User Form
 <OPTION VALUE="Add">Local Database Add
 <OPTION VALUE="Upd">Local Database Update
 <OPTION VALUE="Del">Local Database Delete
 <OPTION VALUE="Src" SELECTED>Local Database Search
 <OPTION VALUE="Act">Concurrent Log-in Search (U/C)
 <OPTION VALUE="Adm">Administer User List
 </SELECT>

 <INPUT TYPE=SUBMIT>
</FORM>
```

---

## Notes

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## Example of Select Tab

What do you wish to do?

## Multiple Selection Sample

```
<H1>Example of Select Tab</H1>

<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
 <H2>What do you wish to do?</H2>

 <SELECT NAME="code" MULTIPLE>
 <OPTION VALUE="New">New User Form
 <OPTION VALUE="Add">Local Database Add
 <OPTION VALUE="Upd">Local Database Update
 <OPTION VALUE="Del">Local Database Delete
 <OPTION VALUE="Src" SELECTED>Local Database Search
 <OPTION VALUE="Act">Concurrent Log-in Search (U/C)
 <OPTION VALUE="Adm">Administer User List
 </SELECT>

 <INPUT TYPE=SUBMIT>
</FORM>
```

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904/11

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/select-multi.html> for a sample using MULTI

(This one looks different, but the data sent to the server is the same. :-)

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904/11

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## Example of Select Tab

What do you wish to do?

- New User Form
- Local Database Add
- Local Database Update
- Local Database Delete
- Local Database Search**
- Concurrent Log-in Search (U/C)
- Administer User List

Submit Query

## Schedule

- **HTML Authoring**
- **HTML Tables**
- **HTML Forms**
  - Text Input**
  - Buttons**
  - Selection Lists**
  - Paragraph Input**
- **Late Breaking News**

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js>dlk

---

## Notes

**See:** <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/textarea.html>

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js>dlk

## Arbitrary Paragraph-Style Text

(Yakkity Yak Space)

- **An HTML element exists which allows user to enter arbitrary length text**
- **Delimited by <TEXTAREA>...</TEXTAREA>**
- **Text between tags supplied as default data**
  - Formatted literally on output to browser**
  - White space compressed on input to CGI program**
- **Attributes ROWS=xx and COLS=yy sizes input area**
  - Affects screen real estate only**
  - Scroll bars allow user to enter more than what's on screen**
  - Defaults to 1 row with 20 columns (browser dependent, of course)**
- **NAME="xxx" attaches a name to the text area**

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jea/dlk

---

## Notes

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jea/dlk

## Textarea Sample

```
<H2>Murdering Dead Poets Society</H2>
```

```
What changes might you make to Edgar Allen Poe's
<CITE>The Raven</CITE>?

```

```
<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>
```

```
<TEXTAREA NAME="text" ROWS=6 COLS=65>
```

```
Once upon a midnight dreary, while I pondered, weak and weary,
Over many a quaint and curious volume of forgotten lore,
While I nodded, nearly napping, suddenly there came a tapping,
As of some one gently rapping, rapping at my chamber door.
'Tis some visitor," I muttered, "tapping at my chamber door-
Only this, and nothing more."
```

```
</TEXTAREA>
```

```
<INPUT TYPE=SUBMIT VALUE="Change">
</FORM>
```

---


## Notes

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## Example of TextArea Tag

### Murdering Dead Poets Society

What changes might you make to Edgar Allen Poe's *The Raven*?

```
Once upon a midnight dreary, while I pondered, weak and weary,
Over many a quaint and curious volume of forgotten lore,
While I nodded, nearly napping, suddenly there came a tapping,
As of some one gently rapping, rapping at my chamber door.
'Tis some visitor," I muttered, "tapping at my chamber door-
Only this, and nothing more."
```

Change



## <FORM>s Summary

- The <INPUT> tag
  - TEXT allows the user to enter a short line of text
  - PASSWORD is like text, but displays '\*' while user types text
  - CHECKBOX allows the user to make any number of selections
  - RADIO allows the user to make one of a number of selections
  - SUBMIT sends the data on the form to the CGI program
  - RESET sets the data on the form to the initial values
  - HIDDEN allows the author to hide extra stateful data in the form
- The <SELECT> tag
  - OPTION defines the items the user may select
  - MULTIPLE allows the user to select more than one
- The <TEXTAREA> tag
  - Allows the user to enter an arbitrary amount of text

---

## Notes

## Full Form Sample

```
<H1>Summary of FORM data input tags</H1>

<FORM ACTION="http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query"
METHOD=POST>

<H2>< INPUT> types</H2>

TEXT:
 <INPUT TYPE=TEXT NAME="text-input" VALUE="optional">
PASSWORD:
 <INPUT TYPE=PASSWORD NAME="password-input" VALUE="optional">
CHECKBOX:
 <INPUT TYPE=CHECKBOX NAME="checkbox-input" VALUE="button-1">One
 <INPUT TYPE=CHECKBOX NAME="checkbox-input" VALUE="button-2">Two
 <INPUT TYPE=CHECKBOX NAME="checkbox-input" VALUE="button-3">Three
RADIO:
 <INPUT TYPE=RADIO NAME="radio-input" VALUE="button-1">One
 <INPUT TYPE=RADIO NAME="radio-input" VALUE="button-2">Two
 <INPUT TYPE=RADIO NAME="radio-input" VALUE="button-3">Three
```

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jav/dlk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/form-summary.html>

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jav/dlk

## Full Form Sample

(continued)

```
SUBMIT:
 <INPUT TYPE=SUBMIT VALUE="Submit Button Text">
RESET:
 <INPUT TYPE=RESET VALUE="Reset Button Text">
HIDDEN:
 <INPUT TYPE=HIDDEN NAME="hidden-input" VALUE="hidden-value">

<H2><SELECT></H2>

<DL>
<DD><SELECT NAME="select">
 <OPTION VALUE="select-1">Select Option 1
 <OPTION VALUE="select-2">Select Option 2
 <OPTION VALUE="select-3">Select Option 3
</SELECT>
</DL>
```

---

## Notes

## Full Form Sample

(completed)

```
<H2><TEXTAREA></H2>
```

```
<DL>
```

```
<DD><TEXTAREA NAME="textarea" COLS=50 ROWS=4>
```

```
Optional arbitrary text
```

```
</TEXTAREA>
```

```
</DL>
```

```
</FORM>
```

321

ps/dll

---

## Notes

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ps/dll

File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Reload Images Open Print Find

Location: FORUM-TUTORIAL96/form-summary.html

What's New What's Cool Handbook Net Search Net Directory



## Summary of FORM data input tags

### <INPUT> types

- TEXT:
- PASSWORD:
- CHECKBOX:  One  Two  Three
- RADIO:  One  Two  Three
- SUBMIT:
- RESET:
- HIDDEN:

### <SELECT>

### <TEXTAREA>

## Schedule

- **HTML Authoring**
- **HTML Tables**
- **HTML Forms**
- **Late Breaking News**

# CGI-bin Programming

*Designing & Building Your Enterprise WWW Server*

*CGI-bin Programming*

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---

**Notes**



## Schedule

- : **CGI Programming**
  - The CGI Process
  - Catmold -- A Bourne Shell Example
  - WksAction -- A Perl/cgi\_handlers.pl Example
  - WksAction2 -- A Perl/CGI.pm Example
- Image Maps
- Late Breaking News

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msdtk

---

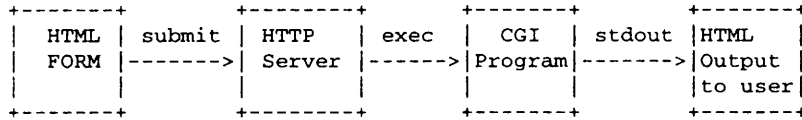
## Notes

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msdtk

## CGI -- The Common Gateway Interface

- The real power of HTML forms lies in Common Gateway Interface programs
- Remember this picture?



- CGI programs tend to live in a specific directory (or set of dirs)  
Configured in server, typically `.../httpd/cgi-bin`  
URLs that reference `/cgi-bin` execute programs here

---

## Notes

## CGI Programs

- **Goal of CGI program is to...**
  - 1) **Receive data from query**

This is technically optional if no user input required
  - 2) **Perform some actions**

This is where your program does it's work
  - 3) **Generate a document to display back to user**

Typically HTML, but can be any MIME Type

---

## Notes

## Data Flow: Client to Server

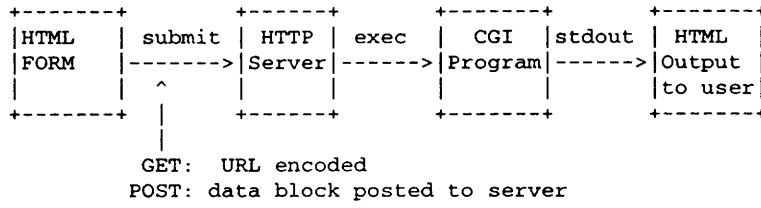
- **How does data flow from HTML form to server?**
- **User selects SUBMIT button on client**
- **For <FORM METHOD=GET>**
  - Client connects to server**
  - Sends query data as part of URL**  
`http://host/cgi-bin/prog?Name1=Value1&Name2=Value2&Name3=Value3`
- **For <FORM METHOD=POST>**
  - Client connects to server**
  - Sends URL as normal**  
`http://host/cgi-bin/prog`
  - Then sends query data in POST data-block**

---

## Notes

## Data Flow Graphically

(A picture is worth 49 words)



---

## Notes

## Data Flow: Server to CGI

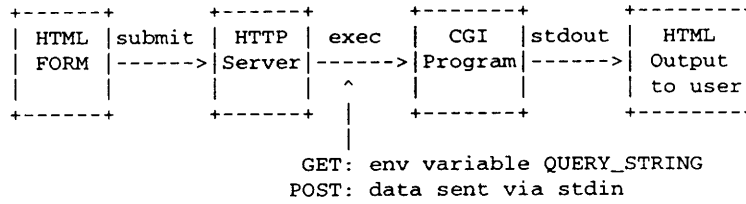
- How does data flow from server to CGI program?
- Server decodes URL enough to identify CGI program
- For <FORM METHOD=GET>
  - Server sets environment variable QUERY\_STRING to query data
  - Exec's an instance of the CGI program
- For <FORM METHOD=POST>
  - Server exec's an instance of the CGI program
  - Writes query data as stdin to program

---

## Notes

## Data Flow Graphically

(Is it worth at least a buck three eighty?)



---

## Notes

## Schedule

- CGI Programming
  - The CGI Process
  - Catmotd -- A Bourne Shell Example
  - WksAction -- A Perl/cgi\_handlers.pl Example
  - WksAction2 -- A Perl/CGI.pm Example
- Image Maps
- Late Breaking News

---

## Notes



## The CGI Process

- **The CGI program tends to follow the following steps**
- **Generate HTTP protocol header**
  - Do this first -- allows parsing errors to be seen
- **Parse the query data in to variables**
  - Source of data is dependent on METHOD used
  - Basic action to perform is the same, though
- **Perform some actions based on the data**
  - This is the meat of the program
  - Mostly left as an exercise for the reader
- **Generate HTML output**
  - We've learned most of this
  - But there are a few new tricks to add

---

## Notes

## CGI Process

(continued)

- **The CGI program can be written in any language**
  - Common languages:** C, /bin/sh, /bin/ksh, awk, perl, tcl
  - Languages with inherent text processing constructs tend to make CGI programmer's job easier**
- **Generating the protocol header is trivial; minimally**
  - Print a Content-type: mime/type line**
  - Then leave a blank line separating header from content**
  - Pseudo code:**

```
print "Content-type: text/html"
print "
```

---

## Notes

## Parsing Query Data

- CGI program parses the query data in to variables
- Query data is encoded to escape special characters (space, = and &)  
Both METHOD=POST and METHOD=GET encode the same
- Remember that the data is in format:  
Name1=Value1&Name2=Value2&Name3=Value3
- Encoding:
  - space* becomes +
  - + becomes %2b
  - = becomes %3d
  - & becomes %26
  - % becomes %25

---

## Notes

## Parsing Query Data

(continued)

- Be prepared to handle empty fields (i.e. null Name=)  
<INPUT TYPE=TEXT> and <INPUT TYPE=PASSWORD>
- Be prepared to handle multiple fields (i.e. Name1=xyz&Name1=abc)  
<INPUT TYPE=CHECKBOX> and <SELECT MULTIPLE>

---

## Notes

## Parsing Data Query

### Pseudo Code

- **Start with query**  
Name1=Value1&Name2=Value2&Name3=Value3
- **Extract Name=Value pairs by splitting on &**  
Name1=Value1 Name2=Value2 Name3=Value3
- **Split on = and set Name equal to Value**  
Name1 assigned Value1  
Name2 assigned Value2  
Name3 assigned Value3
- **Translate encodings**  
Replace +'s with spaces  
Replace %XX with ASCII equivalent of hex XX

---

## Notes

## GET -vs- POST

- **METHOD=GET**
  - Query data in QUERY\_STRING environment variable**
  - Often limits query to several hundred bytes**
  - Simply need to parse data out of QUERY\_STRING**
- **METHOD=POST**
  - Query data in stdin**
  - End-of-file is not guaranteed**
  - Parse header for Content-length value**
  - Use that for end-of-file**
  - Once data read, parse same as above**
- **Industry preference seems to be METHOD=POST**
  - A tad more work, but also more reliable**

---

## Notes

## Process The Data

- **CGI program performs some actions based on the data**
- **Data available includes fields from HTML form**
  - Data entered by user**
  - Fields with default data**
  - Hidden fields**
- **Data also includes certain env variables the server sets**
  - Full list at <http://hoohoo.ncsa.uiuc.edu/cgi/env.html>**
  - PATH\_INFO -- full path info (URL encoded)**
  - PATH\_TRANSLATED -- full path info (translated)**
  - QUERY\_STRING -- encoded string of query**
  - REMOTE\_HOST -- host name of host making query**
  - REMOTE\_ADDR -- IP address of host making query**

---

## Notes

## Process The Data

(env variables continued)

**AUTH\_TYPE** -- type of authentication being used  
**REMOTE\_USER** -- authenticated user name  
**REMOTE\_IDENT** -- not-to-be-trusted remote user name  
**HTTP\_USER\_AGENT** -- browser the remote user is using

---

## Notes



## Generate HTML Output

- CGI program generates a document to return to user
- Anything written to stdout and stderr goes to remote user
  - Remember that we've already printed Content-type above
  - Typically HTML output, but can be any valid MIME type
  - text/html, text/plain, image/gif, audio/basic
- Simply write HTML to standard output
  - Server will intercept and forward to browser
- Note no requirement to generate output after processing
  - Can generate output on the fly while processing

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juw@dk

---

## Notes

CERN server sends both stdout and stderr to client.

NCSA server sends stdout to client, stderr to error\_log.

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juw@dk

## Pseudo Code for Generating Output

```
print "Content-type: text/html"
print ""

(decode input data here)

print "<HTML>"
print "<HEAD>"
print "<TITLE>Document Title</TITLE>"
print "</HEAD>"
print "<BODY>"

(process data here)

print "</BODY>"
print "</HTML>"
```

---

## Notes

## CGI Tools

- **A number of tools exist to make CGI programming easier**
- **Bourne Shell**
  - AArchie Gateway -- sed/awk calls to convert GET data**  
`ftp://ftp.ncsa.uiuc.edu/Web/httpd/Unix/ncsa_httpd/cgi/AA-1.2.tar.Z`
- **C language**
  - Default NCSA scripts -- Can reuse code to translate query string**  
`ftp://ftp.ncsa.uiuc.edu/Web/httpd/Unix/ncsa_httpd/cgi/ncsa-default.tar.Z`
- **Perl**
  - cgi\_handlers.pl -- Perl routines to decode forms**  
`ftp://ftp.ncsa.uiuc.edu/Web/httpd/Unix/ncsa_httpd/cgi/cgi_handlers.pl`
  - CGI-lib -- Perl routines to decode forms**  
`ftp://ftp.ncsa.uiuc.edu/Web/httpd/Unix/ncsa_httpd/cgi/cgi-lib.pl.Z`

---

## Notes

## More CGI Tools

- **Perl (v5 only)**  
**CGI.pm -- Perl library for decoding and generating forms (v2.23)**  
[http://www-genome.wi.mit.edu/ftp/pub/software/WWW/cgi\\_docs.html](http://www-genome.wi.mit.edu/ftp/pub/software/WWW/cgi_docs.html)
- **TCL**  
**TCL Argument Processor - Routines to retrieve data**  
[ftp://ftp.ncsa.uiuc.edu/Web/httpd/Unix/ncsa\\_httpd/cgi/tcl-proc-args.tar.Z](ftp://ftp.ncsa.uiuc.edu/Web/httpd/Unix/ncsa_httpd/cgi/tcl-proc-args.tar.Z)

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js/dk

---

## Notes

**Don't get CGI.pm off ftp.ncsa.uiuc.edu; it's a very old version.**

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js/dk

## Schedule

- **CGI Programming**
  - The CGI Process**
  - Catmold -- A Bourne Shell Example**
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- **Image Maps**
- **Late Breaking News**

---

## Notes

## Really Simple CGI Example

- **This example will simply display the system's MOTD file**
  - There is no input data to parse**
  - Generates HTTP header**
  - Generates HTML header**
  - Generates HTML body**
  - Prints /etc/motd in the process**
- **Create the file with your favorite text editor**
- **Put a copy in cgi-bin directory**

---

## Notes

## Sample: cgi-bin/Catmotd

```
#!/bin/sh

Gimme an HTTP header!
echo "Content-type: text/html"
echo ""

Now an HTML header
echo "<HTML>"
echo "<HEAD>"
echo " <TITLE>Message-of-the-Day</TITLE>"
echo "</HEAD>"
echo ""
```

(continued)

---

## Notes

## Sample: cgi-bin/Catmotd

(continued)

```
And finally an HTML body
echo "<BODY>"
echo "<H2>The message-of-the-day is:</H2>"
echo "<PRE>"
cat /etc/motd
echo "</PRE>"
echo "</BODY>"
echo "</HTML>"
```

---

## Notes



## Testing CGI Script by Hand

- **First test the script by invoking it by hand**
- **Change directory to cgi-bin and run ./Catmold**  
**This is made easier because script does not require input**
- **Validate that it generates the output you expect, namely...**
  - an HTTP header**
  - and valid HTML code**

---

## Notes

## Testing CGI Script by Hand

```
www.dlk% ./Catmotd
Content-type: text/html
```

```
<HTML>
<HEAD>
 <TITLE>Message-of-the-Day</TITLE>
</HEAD>
```

```
<BODY>
<H2>The message-of-the-day is:</H2>
<PRE>
Sun Microsystems Inc. SunOS 5.5.1 Generic May 1996
```

```
The system will be down Tuesday from 0600 - 0800 to add
additional disk space for the Engineering special project.
```

```
</PRE>
</BODY>
</HTML>
www.dlk%
```

---

## Notes

## Testing CGI Script on the Server

- **Next, test script by manually opening URL**  
Select "Open" or "Goto" and enter URL of script  
`http://www/cgi-bin/Catmotd`  
Should return a nice, formatted page
- **Finally, create an HTTP document with reference to document**  
`<FORM ACTION="/cgi-bin/Catmotd">`  
Press this button to view the Message-of-the-Day  
`<INPUT TYPE=SUBMIT VALUE="MOTD">`  
`</FORM>`
- **Or, create a stealth link to the script**  
The `<A HREF="/cgi-bin/Catmotd">Message-of-the-Day</A>` lists important information you need to know about system status.

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pub/dk

---

## Notes

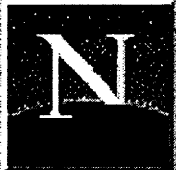
See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/Catmotd.html>

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pub/dk

File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Reload Images Open Print Find



Location:

What's New What's Cool Handbook Net Search Net Directory

### The message-of-the-day is:

Sun Microsystems Inc. SunOS 5.5.1 Generic May 1996

## When Things Go Wrong

This was so simple, what could possibly go wrong?

- **Symptom: raw display of HTML code**  
**Probable cause: problem in HTTP header**  
**Likely sent Content-type: text/plain instead of text/html**  
**Solution: fix Content-type**
- **Symptom: browser brings up save dialog box**  
**Probable cause: invalid Content-type, probably a typo**  
**Solution: fix Content-type**
- **Symptom: raw display of HTML code. but body only**  
**Probable cause: forgot to send HTTP header entirely**  
**Browser is interpreting HTML header as HTTP header**  
**Solution: add code to send HTTP header (Content-type)**

---

## Notes

## When Things Go Wrong

What, there's more?

- **Symptom:** Error: malformed header from script (*Mosaic*)  
**Probable cause:** forgot to send HTTP header entirely  
**Solution:** add code to send HTTP header (Content-type)
  
- **Symptom:** Error 500; Bad script request -- /cgi-bin/Catmotd is not executable  
**Probable cause:** execute bit not set on script  
**Solution:** chmod +x Catmotd  
**Other causes:** script doesn't exist, or typo in ACTION

---

## Notes

## When Things Go Wrong

This had better be it...

- **Symptom (CERN):** Error 500; Internal error: execve() failed
- **Symptom (NCSA):** You don't have permission to access /cgi-bin/foo on this server.

**Probable cause:** tried to execute something other than a script

**Maybe a directory; CERN's httpd does not allow CGI scripts in subdirs by default, so /cgi-bin/dir/script attempts to execute /cgi-bin/dir... bumper**

**Solution:** add an additional Exec line to config/httpd.conf (CERN)

**Solution:** add an additional ScriptAlias line to config/srm.conf (NCSA)

---

## Notes

## Schedule

- **CGI Programming**
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  - WksAction2 -- A Perl/CGI.pm Example**
- **Image Maps**
- **Late Breaking News**

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js/dk

---

## Notes

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js/dk



## A Perl Example

- Let's build a more complex example
- This one will illustrate
  - CGI scripts in Perl
  - The use of the POST method
  - Passing and processing of data
  - The use of the `cgi_handlers.pl` library

---

## Notes

## HTML Source

```
<HTML>
<HEAD>
<TITLE>Workstation Action Request</TITLE>
</HEAD>

<BODY>
<H2>Workstation Request Form</H2>
This form may be used to request an action to be performed by the
System Administration group. Please complete all the fields below,
then press the <KBD>Submit Request</KBD> button. Report any problems
to the System Administration Group.<P>

<FORM METHOD=POST ACTION="/cgi-bin/WksAction.pl">
Your name: <INPUT TYPE=TEXT NAME="Name">

Room number: <INPUT TYPE=TEXT NAME="Room" SIZE=5>

<INPUT TYPE=RADIO NAME="Bldg" VALUE="Carson">Carson Hall
<INPUT TYPE=RADIO NAME="Bldg" VALUE="Donner">Donner Hall
<INPUT TYPE=RADIO NAME="Bldg" VALUE="Pacheco">Pacheco Hall
<INPUT TYPE=RADIO NAME="Bldg" VALUE="Altamont">Altamont Hall

```

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ms/dk

---

## Notes

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ms/dk

## HTML Source

(continued)

Workstation type:

```
<SELECT NAME="Wks">
 <OPTION VALUE="Sun">Sun Microsystems
 <OPTION VALUE="SGI">Silicon Graphics
 <OPTION VALUE="HP">Hewlett Packard
 <OPTION VALUE="Other">Other
</SELECT>

```

Please describe the work you would like done:

```
<TEXTAREA NAME="Act" ROWS=6 COLS=70></TEXTAREA>

```

```
<INPUT TYPE=SUBMIT VALUE="Submit Request">
```

```
<INPUT TYPE=RESET>
```

```
</FORM>
```

```
</BODY>
```

```
</HTML>
```

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js/dk

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/WksAction.html>

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js/dk

File Edit View Go Bookmarks Options Directory Window Help

Back Forward Home Reload Images Open Print Find

Location: RUM-TUTORIAL96/WksAction-test.html

What's New What's Cool Handbook Net Search Net Directory



## Workstation Request Form

This form may be used to request an action to be performed by the System Administration group. Please complete all the fields below, then press the `submit Request` button. Report any problems to the System Administration Group.

Your name:

Room number:

Carson Hall  Donner Hall  Pacheco Hall  Altamont Hall

Workstation type:

Please describe the work you would like done:

## Testing The Form

- **You can test the form out pretty easily**
- **Change the ACTION URL to one of the form test scripts**
  - POST: `http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query`
  - GET: `http://hoohoo.ncsa.uiuc.edu/htbin/query`
- **Then fill in the form and submit it**
  - Will list each variable and value**
- **If form looks good, you can work on script**
- **Remember to set ACTION back to your CGI script!**

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js/dtk

---

## Notes

**See:** `http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/WksAction-test.html`. **When you select Submit Request, it will post the form to** `http://hoohoo.ncsa.uiuc.edu/htbin-post/post-query`.

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js/dtk



Location: sa.uiuc.edu/htbin-post/post-query



## Query Results

You submitted the following name/value pairs:

- Name = David Kensiski
- Room = 222
- Bldg = Altamont
- Wks = SGI
- Act = I need a new mouse.

## WksAction.pl Perl Script

- **The Perl script to process this form is surprisingly simple**
  - Uses the `cgi_handler.pl` Perl library
  - Runs under both Perl 4 and Perl 5
- **Program flow**
  - Call `html_header()` to print header as early as possible
  - Process incoming data with `get_request()`
    - Creates associative array `%rqpairs`
    - So "Name" would be referenced `$rqpairs{Name}`
  - Compose a mail message
  - Compose an HTML reply
    - Give the user feedback and warm fuzzies
  - Finally, call `html_trailer()` to close the body

---

## Notes

## WksAction.pl Code:

using cgi\_handlers.pl

```
#!/usr/local/bin/perl
$wksadmin = "dlk";
require 'cgi_handlers.pl';

Start out with the header
html_header("Workstation Request Confirmation");

Process the form data
get_request();

Send a message to wksadmin
open(SENDMAIL, "|/usr/lib/sendmail $wksadmin")
 || die "$0: cannot pipe to sendmail ($!)\n";
print SENDMAIL "To: $wksadmin\n";
print SENDMAIL "Subject: wks action request for $rqpairs{Name}\n\n";
print SENDMAIL "User: $rqpairs{Name}\n";
print SENDMAIL "Room: $rqpairs{Bldg} / $rqpairs{Room}\n";
```

---

## Notes



## WksAction.pl Code:

(continued)

```
print SENDMAIL "Wks: $rqpairs{Wks}\n\n";
print SENDMAIL "$rqpairs{Act}\n";
close(SENDMAIL);

Now write a confirmation
print "<H2>Submission confirmed!</H2>\n";
print "<DL COMPACT>\n";
print "<DT>User:<DD>$rqpairs{Name}\n";
print "<DT>Room:<DD>$rqpairs{Bldg} / $rqpairs{Room}\n";
print "<DT>Wks:<DD>$rqpairs{Wks}\n\n";
print "</DL>\n";
print "<H3>Action:</H3>\n";
print "$rqpairs{Act}\n";
print "<HR>";

Wrap up with the trailer
html_trailer();
```

---

## Notes

## Testing WksAction.pl by Hand

- Testing a script that requires input is a bit more complex
- Easiest way is to test the script with a script
- Need to set a couple environment variables
  - REQUEST\_METHOD (GET or POST)
  - CONTENT\_LENGTH (bytes in query data)
- Then invoke the script, with input as stdin
  - URL encoded!
- Make sure CONTENT\_LENGTH matches actual length
  - Server should watch for EOF if found, but not rely on it
- Should output HTTP and HTML to the screen

---

## Notes

## Sample: WksAction.test

```
#!/bin/sh

REQUEST_METHOD=POST;export REQUEST_METHOD
CONTENT_LENGTH=70;export CONTENT_LENGTH

./WksAction.pl <<EOF
Name=David+Kensiski&Room=223&Bldg=Carson&Wks=SGI&Act=Install+new+mou
se
EOF
```

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js/dk

---

## Notes

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js/dk

## Sample: output of WksAction.test

```
fs.dlk% sh ./WksAction.test
Content-type: text/html

<html><head>
<title>Workstation Request Confirmation</title>
</head>
<body>
<H2>Submission confirmed!</H2>
<DL COMPACT>
<DT>User:<DD>David Kensiski
<DT>Room:<DD>Carson / 223
<DT>Wks:<DD>SGI
</DL>
<H3>Action:</H3>
Install new mouse
<HR><p>
Generated by: <var>./WksAction.pl</var>

Date: 7:43:11 UT on Sun 1 Oct 95.<p>
</body></html>
```

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js/dlk

---

## Notes

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js/dlk

## Testing WksAction.pl on the Server

- Testing on the server is more difficult
- You could open the /cgi-bin URL by hand to test
  - But takes a lot of work to build query string
  - And to keep typing it each time
- Easier to just use the form at this point
  - We already validated the form with test scripts
- So pull up the form and give it a roll!

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judik

---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/WksAction.html>. When you select Submit Request it will post the form to <http://www.cisco.com/cgi-bin/WksAction.pl>.

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judik



Location: `http://www.cisco.com/cgi-bin/WksAction.pl`

[What's New](#) | [What's Cool](#) | [Handbook](#) | [NetSearch](#) | [Net Directory](#)

## Submission confirmed!

User: David Kensiski

Room:

Altamont / 222

Wks: SGI

### Action:

I need a new mouse.

---

Generated by: `/opt/httpd/root/cgi-bin/WksAction.pl`

Date: 4:6:42 UT on Tue 27 Aug 96.



## More Things To Go Wrong

What? We're not done yet?

- **This example exposes another potential error**
- **Netscape Symptom:** Document contains no data
- **Mosaic Symptom:** Requested document could not be accessed.  
The information server either is not accessible or is refusing to serve the document to you.

**Probable Cause:** errors encountered before HTTP header sent

Either compile-time errors

Or run-time errors very early on

**Solution:** Examine script very closely

Runs as user configured in httpd.conf; check permissions on file

Can that user run perl? And access perl libs?

Are you referencing something in CWD?

---

## Notes

## Schedule

- **CGI Programming**
  - The CGI Process**
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  - WksAction2 -- A Perl/CGI.pm Example**
- **Image Maps**
- **Late Breaking News**

---

## Notes



## CGI.pm

### cool features

- Avail: [http://www-genome.wi.mit.edu/ftp/pub/software/WWW/cgi\\_docs.html](http://www-genome.wi.mit.edu/ftp/pub/software/WWW/cgi_docs.html)
- **Enhanced debugging capabilities**
  - Can enter keyword=value as params or stdin
  - Print all variables with dump()
- **Better support for MULTIPLE items (like SELECT and CHECKBOX)**
  - Returns Perl list (instead of null delimited string)
- **Support for in-line form replies**
- **Easy to detect existence of input data**
- **Perl methods for fetching environment variables**
- **HTML shortcuts for building forms**

---

## Notes

## The Object Oriented Method

- **Let's use the same form, but create a Perl 5 script instead**
  - Use the CGI.pm module**
  - Slightly more complex than cgi\_handlers.pl**
  - But also more flexible**
- **Same basic process flow as above**
  - Swap parsing query and printing header**

---

## Notes

## WksAction2.pl Code:

using CGI.pm

```
#!/usr/local/bin/perl

$wksadmin = "dlk";

use CGI;

Start by parsing the data
$query = new CGI;

Then get the header out quick
print $query->header;
print $query->start_html('Workstation Request Confirmation');
```

*(continued)*

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---

## Notes

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## WksAction2.pl Code:

(continued)

```
Send a message to wksadmin
open(SENDMAIL, "|/usr/lib/sendmail $wksadmin")
 || die "$0: cannot pipe to sendmail ($!)\n";
print SENDMAIL "To: $wksadmin\n";
print SENDMAIL "Subject: wks action request for ",
 $query->param('Name'), "\n\n";

print SENDMAIL "User: ", $query->param('Name'), "\n";
print SENDMAIL "Room: ", $query->param('Bldg'), " / ",
 $query->param('Room'), "\n";
print SENDMAIL "Wks: ", $query->param('Wks'), "\n\n";
print SENDMAIL $query->param('Act'), "\n";
close(SENDMAIL);
```

(continued)

---

## Notes

## WksAction2.pl Code:

(complete)

```
Now write a confirmation
print "<H2>Submission confirmed!</H2>\n";
print "<DL COMPACT>\n";
print "<DT>User:<DD>", $query->param('Name'), "\n";
print "<DT>Room:<DD>", $query->param('Bldg'), " / ",
 $query->param('Room'), "\n";
print "<DT>Wks:<DD>", $query->param('Wks'), "\n\n";
print "</DL>\n";
print "<H3>Action:</H3>\n";
print $query->param('Act'), "\n";
print "<HR>";

Wrap up with the trailer
print $query->end_html;
```

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---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/WksAction2.html>. **When you select Submit Request it will post the form to** <http://www.cisco.com/cgi-bin/WksAction2.pl>.

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File Edit View Go Bookmarks Options Directory Window Help



Location: [www.cisco.com/cgi-bin/WksAction2.pl](http://www.cisco.com/cgi-bin/WksAction2.pl)

What's New What's Cool Handbook Net Search Net Directory

### Submission confirmed!

User: David Kensiski  
Room:  
Altamont / 222  
Wks: SGI

**Action:**

I need a new mouse.

---

## Schedule

- **CGI Programming**
  - The CGI Process**
  - Catmold -- A Bourne Shell Example**
  - WksAction -- A Perl/cgi\_handlers.pl Example**
  - WksAction2 -- A Perl/CGI.pm Example**
- **Image Maps**
- **Late Breaking News**

---

## Notes

## Image Map Introduction

- **An imagemap is a clickable image (GIF file)**
  - Opens a specific URL based on where user clicks on the image
- **There are three pieces to a working image map:**
  - The `imagemap/htimage` program
  - A GIF image to display
  - A map file describing hot regions of image
- **Information available on IHiP (Imagemap Help Page)**
  - <http://www.hway.com/ihip/>

---

## Notes



## The Imagemap Program

- **An imagemap program should come with your server**
  - NCSA uses imagemap**  
<http://hoohoo.ncsa.uiuc.edu/docs/setup/admin/Imagemap.html>
  - CERN uses htimage**  
<http://www.w3.org/hypertext/WWW/Daemon/User/CGI/HTImageDoc.html>
- **If imagemap or htimage is not in cgi-bin...**
  - Either put it there (author's choice)**
  - Or set up Map/Exec directives to run it where it is**

---

## Notes

## The Image

- **Add the image to an HTML doc**
  - Put an `<IMG>` reference to your image, but include `ISMAP` attribute
- **Surround `<IMG>` with `<A>nchor`**
  - `HREF` points to `imagemap/htimage` program
  - And includes path to map file as additional information
  - Additional information coded as path in URL
- **For example, assume...**
  - image is `foo.gif`, `htimage` is in `cgi-bin`
  - map file is in `/usr/www/maps/foo.map`
- **HTML reference would be**
  - `<A HREF="/cgi-bin/htimage/usr/www/maps/foo.map">`
  - `<IMG HREF="foo.gif" ISMAP></A>`

---

## Notes

## Let's pick that URL apart:

```
/cgi-bin/htimage/usr/www/maps/foo.map
```

```

| |
| | +--- File system path to map file
+--- URL path to htimage program
```

- Server executes `/cgi-bin/htimage`
- And passes `/usr/www/maps/foo.map` as input to `htimage`

---

## Notes

## The Map File

- **The map file simply defines geographic regions on the image**
  - Polygon, circle and rectangle**
  - Associates a URL with each region**
  - Optionally identifies a default URL**
- **When user clicks one of the regions**
  - The URL associated with that region is retrieved**
- **NOTE: CERN's htimage does not allow comments**

---

## Notes

## Map File Sample

(wrapped lines are for display purposes only)

```
default click-windtunnel.html
#
Polygon to define F18 body
poly (51,160) (62,142) (47,133) (20,138) (32,122) (19,110) (31,99)
(77,110) (82,106) (77,90) (87,79) (99,89) (129,34) (143,35) (159,26)
(157,46) (137,83) (200,86) (210,73) (201,99) (128,117) (109,143)
(124,154) (108,163) (58,172) (58,172) f18-click.html
#
Rectangle to define the man on the crane
rect (149,158) (169,192) click-man.html
#
Rectangle defining the men in the corner
rect (203,281) (242,250) click-man.html
#
Polygon to define the crane
poly (146,282) (147,266) (152,266) (150,192) (170,192) (172,239)
(188,284) (145,282) click-crane.html
```

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---

## Notes

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## Mapedit

- **The mapedit program helps you build the map file**  
**You could edit by hand, but mapedit is easier**
- **X11 and Windows versions available**  
<http://www.boutell.com/mapedit/mapedit.html>  
**Binaries available for Windows, Solaris, SunOS, Linux, OSF (DEC)**  
**Unix source also available for porting to other platforms**
- **Select shape and define the border**  
**Polygon: left click on vertices, middle click to close**  
**Rectangle: left click on one corner, middle click on other**  
**Circle: left click on center, middle click on edge of circle**
- **After selection, prompts you for URL and comment**
- **Also has test mode to verify regions**

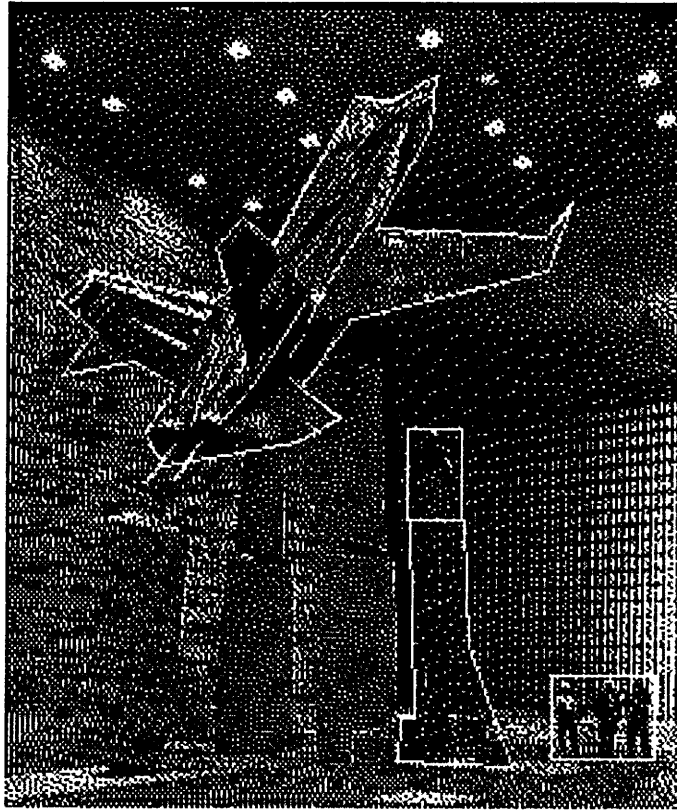
---

## Notes

mapedit

File

Poly Rect Circle Delete Test



## An Example

A clickable image example seems to be in order

- **Our sample is at:**  
<http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/ismap.html>  
**Includes link to the map file**
- **Not interactive in the slides; live demo looks better**

---

## Notes



## Clickable Image Sample

```
<H1>Example of Clickable Images</H1>
```

```


```

This is a rather boring example of clickable images, but it uses what I think is a pretty cool picture. This is a full-size F18 being tested in the world's largest wind tunnel (the 80 x 120 wind tunnel at [NASA Ames Research Center](http://www.arc.nasa.gov)).<P>

There are several regions defined in this image map. None of them do much of anything very interesting, but they do illustrate how image maps work. The source to the map file <f18-map.html> is also available.<P>

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---

## Notes

See: <http://www.cisco.com/publications/www/UNIFORM-TUTORIAL96/ismap.html>.

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File Edit View Go Bookmarks Options Directory Window Help

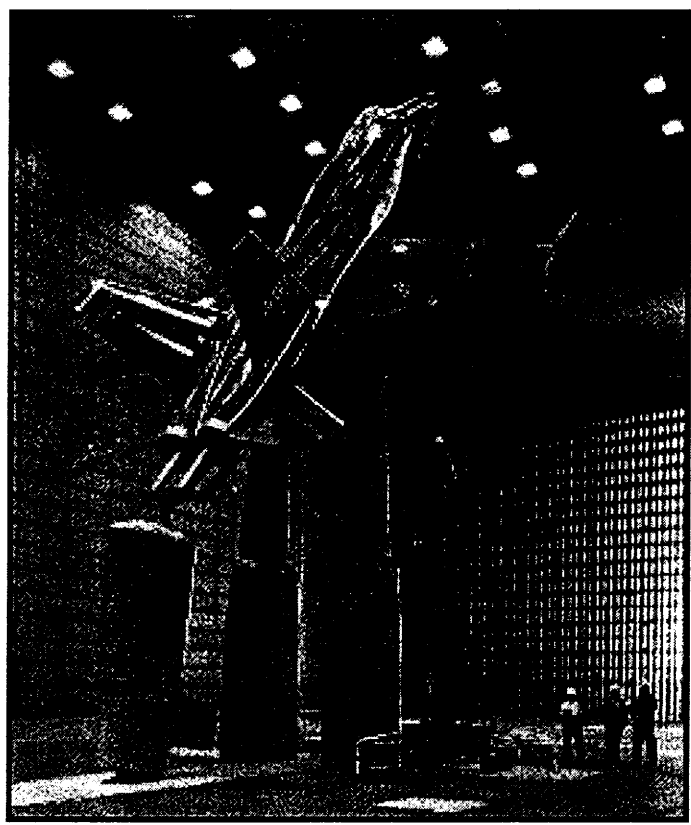
Back Forward Home Reload Images Open Print Find

Location: [www/UNIFORM-TUTORIAL96/ismap.html](http://www/UNIFORM-TUTORIAL96/ismap.html)

What's New What's Cool Handbook NetSearch Net Directory



## Example of Clickable Images



This is a rather boring example of clickable images, but it uses what I think is a pretty cool picture. This is a full-size F18 being tested in the world's largest wind tunnel (the 80 x 120 wind tunnel at [NASA Ames Research Center](#)).

There are several regions defined in this image map. None of them do much of anything very interesting, but they do illustrate how image maps work. The source to the map file

[f18.map](#) is also available.

## Imagemap Shorthand

- Note the short HREF in the image map <A>nchor in the previous example

HREF="/htimage/fl8.map"

- Here's the trick for the CERN server

Assume htimage in /usr/local/www/cgi-bin

Assume all image maps in /usr/local/www/imagemaps

Add the following to config/httpd.conf:

```
Map /htimage/* /cgi-bin/htimage/usr/local/www/imagemaps/*
```

Must be added prior to the Exec /cgi-bin line:

```
Exec/cgi-bin/* /usr/local/www/cgi-bin/*
```

---

## Notes

## How it works

- **Server gets request for** `/htimage/f18.map?x,y`
- **Map line changes it to**  
`/cgi-bin/htimage/usr/local/www/imagemaps/f18.map?x,y`
- **Invokes** `/cgi-bin/htimage`  
**Passes it** `/usr/local/www/imagemaps/map.file?x,y`
- **Htimage opens map file** `/usr/local/www/imagemaps/f18.map`  
**Looks up coordinates** `x,y`  
**Returns URL**

---

## Notes

## Schedule

- **CGI Programming**
  - The CGI Process**
  - Catmotd -- A Bourne Shell Example**
  - WksAction -- A Perl/cgi\_handlers.pl Example**
  - WksAction2 -- A Perl/CGI.pm Example**
- **Image Maps**
- **Late Breaking News**

# Security & The World Wide Web

*Designing & Building Your Enterprise WWW Server*

*Security & The World Wide Web*

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## Schedule

- An Introduction to Security on the World Wide Web
- General Security
- Server Side Security
- Client Side Security
- Proxies and Firewalls
- Attacks
- Byte-Compiled Languages: Java and JavaScript
- Late Breaking News

## Why have security?

(Why have it?)

- **Secure Financial Transactions**  
Credit cards, Digital Cash
- **Secure Information Transactions**  
Contract numbers, source code, SS#, mother's maiden name
- **Institutional Requirements**  
Banking, Government, Commercial, Education
- **Everyone else is doing it!**

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js/dk

## Why not to have security?

(Huh?)

- **Everyone else is doing it!**
- **All data is publicly available**
- **No transactions including sensitive information**

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## So now what?

(So many choices, so little time...)

- **Identify the requirements**
  - Do I need to encrypt the passwords, the data, the results from forms?
- **Write a policy**
  - Security levels, notations, acceptable risk
  - Identify the responsible parties
- **Include monitoring and security audits regularly**

## Schedule

- **An Introduction to Security on the World Wide Web ✓**
- **General Security**
- **Server Side Security**
- **Client side security**
- **Proxies and Firewalls**
- **Byte-Compiled Languages: Java and JavaScript**
- **Attacks**
- **Late Breaking News**

## General Security

- The information is only as secure as the machine it is running on!
- Password expiration is difficult in the Web arena
- Solid backups are critical for tracing root cause
- Knowing what changed and knowing who changed it assists auditing
- Monitoring and knowledge assist uptime

## Schedule

- An Introduction to Security on the World Wide Web ✓
- General Security ✓
- Server Side Security
- Client side security
- Proxies and Firewalls
- Attacks
- Byte-Compiled Languages: Java and JavaScript
- Late Breaking News

## Server Side Security

- Authentication
- Data stream encryption
- Session key
- Server design
- Network physical security
- Network design security
- OS Level security
- Physical security

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---

## Notes

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jns/dk

## Authentication

I am who I am, and that is all that I am!

- **Username/password pair**
  - Available with HTTP/1.0 (and above) authentication capable servers**
  - Directory level control available in some servers based on username, realm, and password combination**
  - Passwords are sent uuencoded**
  - Note: ensure the password file is outside the DocumentRoot**
- **Group Authentication**
  - Content based on entitlement**
  - Services based on entitlement**
  - Note: ensure the group file is outside the DocumentRoot**

---

## Notes

## Authentication (cont.)

- **One time passwords (s/key)**  
Useful for handing out temporary access to your server. Remember, a connection is "sessionless" – if the authorization cookies are kept on the browser end, the end user may continue to wander through your site
- **Kerberos tickets**  
Servers are extensible to use Kerberos tickets for authentication
- **SSL**  
Proves who the server is, not the client

---

## Notes

## Registered User Sites

(You're part of the draft now...)

- In `access.conf`

```
<Directory /usr/local/etc/httpd/htdocs/students>
AuthName STUDENTS
AuthType Basic
AuthUserFiles /usr/local/etc/httpd/conf/.htusers
<LIMIT>
require valid-user
</LIMIT>
</Directory>
```

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---

## Notes

- The user must be in the `AuthUserFiles` file, the password that s/he types in must match the one in the `AuthUserFiles` file. Once entered, that users browser will store the "cookie" of information: hostname, realm name, userid, and password. The next time the user is asked for that realm authentication on that machine, the browser will send it without querying the user.
- `AuthName` defines the "realm"
- "require valid-user" means "the user must be the password file"

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## Data Stream Encryption SSL

[<http://home.netscape.com/newsref/std/SSL.html>]

- **SSL - Secure Sockets Layer**
  - Application independent
  - An "authorize ahead" layer, lower end protocol
- Still in RFC Draft form from Netscape Communications
- RC2 128CBC, RC2 128CBC w/40 MD5, IDEA 128CBC w/MD5, DES64 CBC w/MD5, DES192 CBC w/RC5
- Advantages: public specification, multi-level key algorithms, application independent, large install base
- Disadvantages: still in draft form (RFC/IETF)

---

## Notes

## Data Stream Encryption (cont.) SHTTP

[ftp://ds.internic.net/internet-drafts/draft-ietf-wts-shttp-00.txt]

- **SHTTP - Secure Hypertext Transport Protocol**
  - Application Dependent
  - Spontaneous/session independent communication
- **Encryption and authentication schemas negotiated at the transaction level**
- **Advantages: Provides message protection and session based protection, flexible options for data encryption**
- **Disadvantages: still in draft form (IETF), only available on top of HTTP**

---

## Notes



## **Data Stream Encryption (cont.) SET**

[<http://www.visa.com:80/cgi-bin/vee/sf/standard.html?2+0>]

- **SET - Secure Electronic Transaction**
  - Sponsored by Visa and Mastercard
  - American Express joined in February 1996
- **Uses Digital Envelope's for data confidentiality**
- **Messages formatted using MIME standards; application type not yet defined**
- **Certificate authorities and public/private key authentication**
- **Digital certificate includes: account number and public key. The account number is protected using a blinding technique such that the Certificate Authority, the cardholder, and issuer know the account and the cardholder's name**
- **Netscape already announced it will be integrated into their browser**
- **Expect products by end of 1996**

---

## **Notes**

## Data Stream Encryption Issues

- Do I use it?
- If I use it, what do I use?
- How can I solve all my users needs?
- Where are my users? Nationwide, Worldwide?

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---

## Notes

- Since crypto laws in the U.S. and other countries are different, knowing what level of encryption you are allowed to use is important.

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## Internet "Money"

- **FirstVirtual** [<http://www.fv.com>]  
**Used in the Spyglass browser (no new software needed)**  
**A VirtualPin is assigned that associates your email address and your credit card number. The end user uses only the VirtualPin, and never their own Credit Card number**
- **Digicash** [<http://www.digicash.com>]  
**Special software needed from Digicash (PC, Mac, Unix)**  
**User withdraws money from an electronic bank, uses that money to spend on items. E-Cash is flowing across the Internet**  
**Uses Public Key Encryption**  
**Still in Trial Phase**
- **Cybercash** [<http://www.cybercash.com>]  
**Special software needed (Windows, PowerMac)**  
**A virtual "wallet" as a built in to an existing browser**

---

## Notes

## Session Keys

- **Session is authorized for specified periods of time**
- **Assure session windows, allowing a server to close a connection based on time connected, idle time, total usage time**
- **Kerberos is available in some browsers. This is only good for servers and clients which have access to a Kerberos server (Mosaic)**
- **Usually used for internal systems**

---

## Notes

## Server Design

- **Set up controls on who needs what by deciding entitlement.**
- **Access Control File (ACF)**
  - **Server wide** (`access.conf`)
  - **Per directory** (`.htaccess`)
- **Domain name access** (`access.conf`)
- **Server side includes**
  - `Options IncludesNoExec`
- **Follow symbolic link control**
  - `Options FollowSymLinks`

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---

## Notes

- **Following symbolic links can be dangerous! What happens if HTML page is just a symbolic link to `/etc/passwd`? Now your password file is on your Web site!**

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## Network Physical Security

- **Case Scenario #1: WWW server and client are both internal, no threat from outside, departments all work together without issue**  
**Physical layer "safe" if all data traverses internally**
- **Case Scenario #2: WWW server is external, clients are internal and external**  
**Physical layer "threatened" by external persons who have access to the wire. Internal and external customers have different risk levels. DMZ is required, fixed arp addresses, protocol filters, routers require IP spoof filtering. Acceptable Risk assessment required.**
- **Case Scenario #3: WWW server is external, clients are external**  
**Physical layer "compromised" by external persons who have access to the wire. DMZ needed, protocol filters required, fixed arp addresses, routers require IP spoof filtering. Acceptable Risk assessment required**

---

## Notes

## Network Design Security

- **Separate subnet for WWW machine, FTP server, other externally accessible resources**

<http://www.greatcircle.com/firewalls-book>

- **Protocol source -> destination filter lists ensuring only required protocols make it on that wire**

See your vendor or network administrator

- **Fixed arp addresses on routers**

See your vendor or network administrator

- **Static routes where possible**

See your vendor or network administrator

- **Don't use the corporate internal network as a path for an external customer to get to your site. Leave it "outside"**

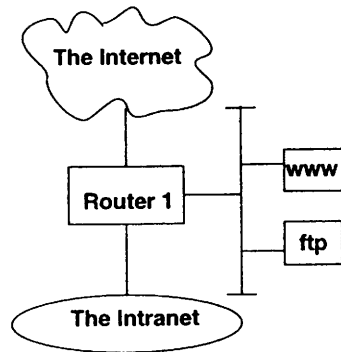
---

## Notes

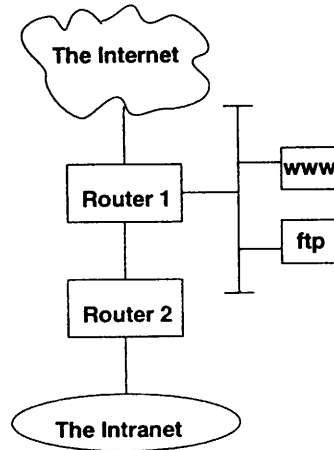
## Network Design Security (cont.)

(AUI, 10baseT, thinnet...)

- Discontiguous network design



- Content housed at a Web provider



---

## Notes



## Operating System Level Security

- **Case Study #1:** the machine is behind a filtering firewall, but SMTP (port 25) is allowed. Furthermore, I'm running sendmail 5.6.5
- **Case Study #2:** My WWW machine is SunOS 4.x GENERIC, and I'm using syslog to record all important statistics
- **Case Study #3:** I don't have an `/etc/ftpusers` file
- **Case Study #3:** I'm using the IRIX 5.x generic password file

---

## Notes

- **A Web Server is only as secure as the OS it is running on. Keep it as secure as possible, as up to date as possible,**

## Physical Security

- The WWW server is sitting on my desk
- I usually leave myself logged in as root (on the console) so other people can use the machine without finding me
- We put our Web machine at a provider's site; the machine is sitting right next to our principal competitor's area

---

## Notes

## Security for the HTTPD Servers

(server generic)

- Automounters and HTTPD - be careful the automounter can't mount other resources in the company!
- Control how the daemon runs [`inetd.conf` or startup scripts]  
Starts as what userid, with what umask, in what directory?
- Watching for robots [`access_log`]
- Forms and sensitive data don't mix without data level encryption
- Electronic mail and sensitive data don't mix without data level encryption
- Security on the server is just as important as the Web software itself

---

## Notes

## Security for the HTTPD Servers (cont.)

(server generic)

- Remove x-csh from the mime.types file on both server and client side
- If the site supports application/postscript, make sure the postscript previewer is current and fixes the "shell executable" call facility that PostScript supports.

---

## Notes

## Security for the NCSA/Apache HTTPD

(server specific)

- **How the server runs (username/groupname)** [httpd.conf]
- **Server root** [httpd.conf]
- **Overall access to the structure** [access.conf]
- **Access to individual hierarchies** [access.conf]
- **AccessFilename** [srm.conf]
- **Allowing individual directory control** [.htaccess]

## Schedule

- **An Introduction to Security on the World Wide Web ✓**
- **General Security ✓**
- **Server Side Security ✓**
- **Client Side Security**
- **Proxies and Firewalls**
- **Attacks**
- **Byte-Compiled Languages: Java and JavaScript**
- **Late Breaking News**

---

## Notes

## Client Side Security

- Authentication
- Data stream encryption
- Session key
- Byte Compiled languages

---

## Notes

## Client Side Security Authentication

(I type and type...)

- **Basic authentication (available in most browsers)**
- **Mosaic 2.2 or later with PGP "authentication"**  
`[http://hoohoo.ncsa.uiuc.edu/docs/PEMPGP.html]`
- **Mosaic 2.5 with Kerberos ticket granting services**  
`[ftp://ftp.ncsa.uiuc.edu/Web/Mosaic/Unix/binaries/]`
- **Netscape with SSL challenge/response - identifies the server only!**  
`[ftp://ftp.netscape.com/-ftp/netscape/]`

---

## Notes



## Client Side Security Data Stream Encryption

(Ibaasbdfsa00+...)

- **Mosaic 2.2 or later with PGP/PEM encryption**  
[<http://hoohoo.ncsa.uiuc.edu/docs/PEMPGP.html>]
- **Netscape, Oracle PowerBrowser, and Spyglass (soon!) with SSL**  
[<ftp://ftp.netscape.com/~ftp/netscape/>]  
[<http://www.oracle.com>]  
[<http://www.spyglass.com>]
- **Secure Mosaic with S-HTTP**  
[<http://www.commerce.net/software/SMosaic/Docs/manual.html>]

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## Notes

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## Client Side Security Session Keys

(tick, tick, tick...)

- **"The cookie"**

A magic combination of user, password, and realm information passed with each request. Avoids having to type your username and password for each protected page in the realm.

- **Remember: the Web is sessionless. You may still be authorized even if your network connection is closed.]**

## Client Side Miscellaneous

- Document Info menu choice on Netscape and other browsers provides information about what server, and what certificate authorization, for the document. This is useful to determine that the page is truly coming and going to the source and destination you expected

---

## Notes

## Schedule

- An Introduction to Security on the World Wide Web ✓
- General Security ✓
- Server Side Security ✓
- Client Side Security ✓
- Proxies and Firewalls
- Attacks
- Byte Compiled Languages: Java, JavaScript
- Late Breaking News

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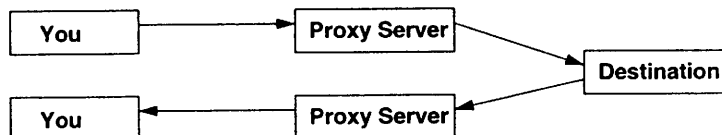
## Notes

## Proxies and Firewalls

(what are they anyway?)

- **Proxies**

A machine stands in the "middle" of your request and the destination for your request. In doing so, it limits the number of machines requiring direct access to the Internet.



- **Firewalls**

A machine (hardware and software combined) to "filter" traffic, stop traffic that doesn't belong, control access internally and externally for services. Frequently installed on filtering routers by using access lists.

- **Read: Building Internet Firewalls - Chapman and Zwicky, O'Reilly & Associates, Inc.**

---

## Notes

## WWW Clients through a Firewall

(it can be done...)

- **SOCKS NCSA Mosaic available**  
[<ftp://ftp.nec.com/pub/security/socks.cstc>]
- **Mosaic 2.2 and later support proxy gateways**  
[<http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/proxy-gateways.html>]
- **SOCKS/Proxy support inside Netscape**  
[Preferences -> Mail and Proxies menu]
- **SOCKS/Proxy support inside Spyglass**  
[Preferences -> Proxies menu]

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---

## Notes

- **Each browser has something slightly different; refer to your browsers documentation for more information.**

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## Setting up a Proxy Server or Firewall HTTPD

(it also can be done...)

- **CERN httpd server**  
[ftp://www0.cern.ch/pub/www/src/WWWDaemon.tar.Z]  
**Can act as a proxying server on the firewall machine**  
**Can be compiled as a SOCKS compliant Proxy server**
- **W3C**  
[ftp://ftp.w3.org/pub/httpd]
- **SOCKS System**  
[ftp://ftp.nec.com/pub/security/socks.csc]  
**Acts as a pass through controlled proxy server**
- **Netscape Proxy Server**  
[http://www.netscape.com]

---

## Notes

## Schedule

- An Introduction to Security on the World Wide Web ✓
- General Security ✓
- Server Side Security ✓
- Client Side Security ✓
- Proxies and Firewalls ✓
- Attacks
- Byte-Compiled Languages: Java and JavaScript
- Late Breaking News

---

## Notes



## Attacks

- Denial of Service
- "Sniffing" and "spoofing"
- Damaging information
- Others

## Denial of Service Attacks

- Bad guy takes all httpd service
  - Remember, it may not be a browser - a robot hits much faster
- Bad guy fills up filesystem on WWW server
  - Log files are truncated, records lost
- Bad guy changes router filters
- Bad guy kills httpd processes
- Bad guy removes password file because the parent directory was world writable.
- Bad guy "damages" machine
  - Fills process table, uses all available memory, kills inetd

## Denial of Service Attacks (cont.)

- **Bad guy spoofs server**  
Changes DNS, connects to same wire
- **Bad guy causes other programs to stop service**  
Load average stops sendmail from delivering or receiving  
Too many FTP connections stops others from using FTP service

## Sniffing and Spoofing Attacks

(My name is Copper; I'm a hound dog...)

- **Sniffing**  
Sniff out the account username and password  
Record the session, obtain company data
- **Spoofing**  
Act as the FTP or Web Server  
Present a bogus form which requires password, record the password

## Sniffing and Spoofing Attacks (cont.)

- **Person in the Middle**

The person in the middle attack is where there are three players: the real client, the real server, and the bad guy. The bad guy client is on the network between the real server and real client. The bad guy listens to the packets, and then assumes a position where the bad guy acts as if he is the real server

SSL - defeats through never having all the information. Server certificates, private keys, name checks, real server's private key

SHTTP - defeats through never having all the information

SET - defeats by never having all the information. Server certificates, private keys, name checks, Certificate Authority checks.

## Sniffing and Spoofing Attacks (cont.)

- **Replay Attack**

The replay attack is simple: the bad guy records an entire session between a real server and a real client, then replays the real client side back to the server (then listening for the responses)

SSL - defeats through session agreed session id. The session id is generated outside of the bad guy control

SHTTP - defeats through a Message Authenticity Check (MAC)

SET - defeats through Transaction Identifiers (XID), or Request/Response Pair (RRPID) identifiers for message pairs that span multiple transactions.

## **Damaging Information Attacks**

- **Replace home page with a "login required" home page**
- **Change phone number for company**
- **Change feedback form**
  - Competitor gains new leads sent to them**
  - Students "private" information not so private anymore**
  - Statistics skewed by false answers**
- **Financial information**
  - Bankruptcy announcement**
  - Profit loss**
  - Profit gain**
  - Layoffs**

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---

## **Notes**

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## **Damaging Information Attacks (cont.)**

- **False product announcements**
- **Fake problem diagnosis procedures**
- **Misleading or damaging security advisories**
- **Fake earning announcements**
- **Job termination announcements**

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---

## **Notes**

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## Other Attacks

- **Cracking Ciphers**

SSL is only as secure as the digest algorithms it uses. If these algorithms are broken, SSL is insecure. The current cryptographic attack for these algorithms is brute force - it is a costly exercise to learn one session

SSL - 40bit size key brute force, 128bit key size cracked (bad seed)

SHTTP - 40bit DES was cracked

## Other Attacks (cont.)

- **Clear Text Attack**

If the bad guy has some idea what text is sent during a session, the session cipher key can be compromised. The cryptographic algorithms are similarly difficult, especially where > 40 bit size keys are available

If the keys increase with the computational power, the keys cannot be brute force attacked.

SSL - bigger keys ensure this will be ok.

SHTTP - bigger keys ensure this will be ok.

## Detection and Prevention

- **Latro (Iatrodectus cyberneticus)**  
**Author: Tom Christensen**  
<http://www.perl.com/perl/scripts/latro.html>  
**Designed to detect what PC based machines have a perl executable in cgi-bin**

## Schedule

- **An Introduction to Security on the World Wide Web ✓**
- **General Security ✓**
- **Server Side Security ✓**
- **Client Side Security ✓**
- **Proxies and Firewalls ✓**
- **Attacks ✓**
- **Byte-Compiled Languages: Java and JavaScript**
- **Late Breaking News**

## Byte Compiled Languages

(Take a bite... it's a magic apple!)

- Intended to "solve" some issues with server side execution vulnerabilities. Allows for flexibility and logic pathways for dynamic content
- Has its own security risks, included the series found in Java and JavaScript
- **Java** - [<http://www.java.sun>]
  - Client side execution
  - Symantec just introduced "Just in Time" compiler to make Java code 32-bit Windows machine code. Other vendors are following.
- **Python** - [<http://www.python.org>]
  - Object oriented, could be client side execution
- **Safe TCL** [<http://gdbdoc.gdb.org/letovsky/tcl/ccitcl.html>]
  - Client side interpreted TCL

## Java

- **Java Developers Kit 1.0.2**
  - Fixed class loader bug (where app could load any class)
  - If applet cannot get DNS information, it cannot connect to "outside machines"
  - Client hostname and IP address no longer available to applet. `getHostName` now treated as a TCP connection to `localhost/127.0.0.1`
- Drew Dean ([ddean@cs.princeton.edu](mailto:ddean@cs.princeton.edu)) and Ed Felton ([felten@cs.princeton.edu](mailto:felten@cs.princeton.edu)) announced that they had successfully exploited a bug in Java to create applet that deletes a file on the user's local disk. Fixed in Netscape >2.01 and in JDK 1.0.2.
- An applet can contact any host, not just the host it came from (as was supposed to be the case. Fixed in Netscape >2.01 and JDK 1.0.2.
- Java security flaw with Internet Explorer, avoiding dialog box triggering for downloading potentially dangerous files (like MS-Word documents, etc.)



## Javascript

- **Ability to upload local files to any machine. Requires user interaction (click a button) - but that intervention may appear safe ("Click here for more information")**
- **Obtain directory listings of local filesystems**
- **Can write to local files. It requires that the user go through a "Save" Dialog box, but suggests that JavaScript's claim that it "cannot write to local files" is wrong**
- **Can monitor activity of a given browser session and send that session to another machine. Also requires user interaction**
- **Can present arbitrary (and potentially nasty sounding) dialog boxes**

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## Java and JavaScript

- **Denial of service applets**
  - Slows machine to crawl**
  - Fills up memory cache**
  - Constantly downloads documents**

[<http://www.math.gatech.edu/~mladue/HostileApplets.html>]

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## Schedule

- **An Introduction to Security on the World Wide Web ✓**
- **General Security ✓**
- **Server Side Security ✓**
- **Client Side Security ✓**
- **Proxies and Firewalls ✓**
- **Attacks ✓**
- **Java and JavaScript ✓**
- **Late Breaking News**

# Secure CGI-bin Programming

*Designing & Building Your Enterprise WWW Server*

*Secure CGI-bin Programming*

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## Schedule

- Writing Secure CGI's
- Server Problems
- Late Breaking News

## User Authentication

- Environment variable 'REMOTE\_USER' - should you trust it?
- Store a user profile separately; it allows for all programs to reference information about the user, ensure entitlement, list addresses, etc.
- Dialback credit card authorization. Contact the Web site, ask for a credit card transaction, the Web server dials your phone number and asks for the credit card information, authorizes it with the credit card company, and completes the transaction.

---

## Notes

## GET vs POST

- GET

Sends the arguments over as "part of the URL"

URL data has to be parsed, subject to problem parsing or buffer size problems. The data body is frequently parsed through `awk`, `sed`, `cat` calls from shell scripts (instantly making it insecure)

Data could be truncated due to line length limits. It makes for bulky URL's, and users will bookmark the URL as is.

- POST

Sends the arguments over as an "object"

Object can be broken down into components. Those components are each field values, and may be analyzed individually. Considered the "right way."

---

## Notes

## Race Conditions

- Many need access to multiple resources. Program A gets resource 1 and wants access to resource 2. Program B gets resource 2 and wants access to resource 1. Deadlock
- Process attaches to a changing file, seeks and EOF calls get confused; runs into an endless loop or dies
- Process stomps over locking that another process has (e.g. no checks) - both processes are updating and changing same resource. Last one out wins.
- No true locking for a DBM. Advisory locks permitted, but must be coded for locking the .dir file

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---

## Notes

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## Common Issues

- **umask settings**

```
% cat ./testit
#!/bin/sh
touch foo
% ./testit
% ls -dgl foo
-rw-rw-rw- 1 jns cisco 0 Sep 30 21:48 foo
```

- **Corrected version**

```
% cat ./testit.correct
#!/bin/sh
umask 022
touch foo
%
```

---

## Notes



## Common Issues

- **Sequential access to large files - increases load, and decreases effectiveness.**

```
#!/opt/local/bin/perl
$db = "/opt/local/lib/foo";
dbmopen(%DBM, $db, 0644);
while (($key, $val) = each %DBM) {
 $a .= $val;
}
dbmclose(DBM);
```

---

## Notes

## Common Issues (cont.)

- **lockfiles**

```
#!/opt/local/bin/perl
$lock = "/tmp/run.lock";
die "$0: file locked\n" if (-e $lock);

open(F_LOCK, "> $lock");
print F_LOCK $$;
close F_LOCK

open(F_MOTD, "/etc/motd") ||
 die "$0: no /etc/motd file!\n";
while (<F_MOTD>) {
 print;
}
```

---

## Notes

## Common Issues (cont.)

- **checking exit status**

```
#!/bin/sh
rm -f /tmp/foo
echo "locked" > /tmp/foo
```

**-VS-**

```
#!/bin/sh
rm -f /tmp/foo
if [$? == 0]
then
 echo "locked" > /tmp/foo
else
 exit 1
fi
```

---

## Notes

## Common Issues (cont.)

- **filesystem was full, the temporary password file is 0 length, and I just overwrote the active password file without checking**

```
#!/opt/local/bin/perl
open(F_PASSWD, "/etc/passwd") || die;
open(F_TMP, "/tmp/passwd") || die;
while (<F_PASSWD>) {
 print F_TMP unless /^root/;
 print F_TMP "root::0:1:CIO-Sys Root Account :/bin/csh\n";
}
rename ("/tmp/passwd", "/etc/passwd");
```

- **Correction: check error codes, close filehandles, check file sizes.**

---

## Notes

## Common Issues (cont.)

- **Insecure PATH's**

```
#!/bin/sh
```

```
PATH=/tmp:/bin:/usr/bin
```

```
ls -l | awk '{print $1}'
```

- **Correction: limit the PATH to what is absolutely necessary**

---

## Notes

## Common Issues (cont.)

- **Temporary filename naming conventions**

```
#!/bin/sh
echo "hi" > /tmp/foo.lock
```

- **Correction: make sure the lockfiles are unique**

```
#!/bin/sh
echo "hi" > /tmp/foo.$$
```

---

## Notes

## Common Issues (cont.)

- **CGI's querying databases or other resources**
- **Ensure only pre-formed queries wherever possible**
- **Heavily parse and screen for bad arguments at destination**
- **Don't store userid's and password's in cleartext**

```
fprintf(fd, "%c", 'p');
fflush(fd);
fprintf(fd, "%c", 'a');
fflush(fd);
fprintf(fd, "%c", 's');
fflush(fd);
fprintf(fd, "%c", 's');
fflush(fd);
```

- **CERN server sends both STDERR and STDOUT back to the client.**

---

## Notes

## Common Issues (cont.)

- **PATH and LD\_LIBRARY\_PATH dependencies**  
Directly affects behaviour
- **Different operating systems, common scripts**  
Difficult to do, can cause weird side affects
- **File locking**  
Make sure all programs are locking common resources in the same way
- **Traceability and logging**  
Logging activities always assists discovering what went wrong
- **Failure tracking and notification**  
If something fails, is anybody watching?

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---

## Notes

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## Perl Issues

- **Backticks and system calls**

```
`cat $file` # unsafe
```

**-vs-**

```
system("cat $file"); # unsafe
```

**-vs-**

```
system("cat", "$file"); # "safe"
```

---

## Notes

## Perl Issues (cont.)

- **Atomic lockfile creation**

**Can be done for non-root activities:**

```
$umask = umask(777);
open(FH, "/etc/passwd") || die;
umask($umask);
```

- **Cannot be done for non-root users which creates a race condition.**

---

## Notes

## Perl Issues (cont.)

- **Parsing errors (undefined or a bad argument)**

```
#!/opt/local/bin/perl
$USER = $ENV{'USER'};
open(F_USER, "/profiles/$USER") || die;
while (<F_USER>) {
 print;
}
close F_USER;
```

- **Correction:**

```
die "$0: USER undefined\n" if ($USER =~ /\s*\.\s*$/);
```

---

## Notes

## Perl Issues (cont.)

- **Too many file handles**

```
#!/opt/local/bin/perl
foreach $file (@ARGV) {
 open(F_$file, "$file");
}
```

- **Correction:**

```
die "$0: too many files to open" if ($#ARGV > 15);
```

---

## Notes

## Perl Issues (cont.)

- **Improper handling on filehandles**

```
#!/opt/local/bin/perl
open(F_MOTD, "/etc/motd");
while(<F_MOTD>) {
 print;
}
close F_MOTD;
```

- **Correction:**

```
open(F_MOTD, "/etc/motd") || die "$0 can't open /etc/motd";
```

---

## Notes

## Perl Issues (cont.)

- **\$< (euid) and \$>(egid) variables**

```
#!/opt/local/bin/perl
if ($< == 0) {
 $< = 200;
}
```

- **chroot**

```
#!/opt/local/bin/perl
if ($< == 0) {
 chroot("/safedir");
}
```

---

## Notes

## taintperl/perl -T/strict

- **tainting is where input provided by user is passed improperly off to operations where the shell could be exploited by the input**
- **Example: user passes a filename, and that filename is passed to a `'cat $filename'` call. Taintperl/Perl 5 'script' notes that and stops execution with an error unless `$filename` is properly parsed**
- **Very helpful for sanity checking on secure perl programming**
- **Can be "worked around" through pattern matching**

---

## Notes

## sh/csh Issues

- **IFS**  
cause argument parsing to change

```
$ cat ./testit
#!/bin/sh
IFS=:
echo $1

$./testit a:b:c
a b c
$
```

---

## Notes



## sh/csh Issues (cont.)

- **setenv**

**overwrite PATH**

```
$ cat ./testit
```

```
#!/bin/sh
```

```
eval $1="hi"
```

```
echo $FOO
```

```
$./testit FOO
```

```
hi
```

```
$
```

---

## Notes

## sh/csh Issues (cont.)

- **awk**  
is a command language which can be altered by variables (backticks)
- **sed**  
garbled strings  

```
#!/bin/sh
string="/"
sed -e /$string//g
```
- **argument parsing**  
watch out for arguments that look like flags, backticks, commands, etc
- **Behaviour changes with startup files** (.cshrc, .profile)

---

## Notes

## C Issues

- **popen**

**Runs a shell with the arguments.**

```
#include <stdio.h>

void main (int argc, char *argv[]) {
 char command[60];
 sprintf(command, "/bin/cat %s", argv[1]);
 popen(command, "w");
}
```

---

## Notes

## C Issues

- `gets`

```
#include <stdio.h>
void main (int argc, char *argv[]) {
 char file[60];
 gets(file);
}
```

**There is no flow control on `gets` - it doesn't stop filling even if the array is complete. Subject to buffer overruns.**

---

## Notes

## C Issues

- **Buffer sizes**

```
#include <stdio.h>

void main (int argc, char *argv[]) {
 char name[20];

 sprintf(name, "%s", argv[1]);
 printf (":%s:", name);
}
```

- **Don't use Content-length header exclusively; set a maximum value in case the header is spoofed.**

---

## Notes

## C Issues (cont.)

- Malloc'd arrays - don't forget!

```
#include <stdio.h>

void main (int argc, char *argv[]) {
 char *name;

 sprintf(name, "%s", argv[1]);
 printf (":%s:", name);
}
```

---

## Notes

## C Issues (cont.)

- Non-terminating loops - always have an out

```
#include <stdio.h>
void main (int argc, char *argv[]) {
 int truth = 0;
 int i = 0;

 while (!truth) {
 if (strcmp(argv[i], "yes"))
 truth++;
 i++;
 }
}
```

---

## Notes

## C Issues (cont.)

- **Inherited file descriptors**

**A forked process will inherit all open file descriptors. Furthermore, those file descriptors will be maintained across `execve` calls**

**Close `unnneeded` file descriptors before further action by the child, and before `execve`. If filehandles are needed in the case where the `execve` fails, set `fcntl` calls with `F_SETFD` flags**

- **Inherited environment**

**`PATH` environment variable, current working directory, chrooted environment**

---

## Notes



## C Issues (cont.)

- **seteuid**
- **setegid**
- **chroot**
  - chroot != secure**
  - Filehandles are passed**
- **Dynamic vs static linking**
  - Exploit the operation by replacing a library that the calling program uses**
  - Executables are larger**

---

## Notes

## Attacks

- **Weakness Exploitation**

What we've covered so far

- **Denial of service**

Form accesses large database, locks it, robot spams this CGI, machine denies service to regular users

- **Fake transactions**

Information submitted is invalid. User submits feedback from feedback form as if he were from another company. That information is wrong, but is believed. Many meetings are called to figure out why Acme Inc. is angry at us, and so on.

---

## Notes

## Answers

- **CGIWrap** [<http://www.umr.edu/~cgiwrap/>]  
Forces CGI's to run as the person who owns the CGI. Good and bad. If you install the CGI and forget to chown it, it runs as you!
- **Taintperl**  
Good for argument checking, assuring nothing gets out to a shell, filenames are "correct"
- **Design strategies which assure "getting in and getting out, quickly"**  
Don't sequentially walk large DBM's or lock resources for the duration of programs if not needed.
- **Force shells to startup without reading the startup files**
- **Don't believe everything you read - including this slide???**

---

## Notes

## Schedule

- Writing Secure CGI's ✓
- Server Vulnerabilities
- Late Breaking News

## Server Vulnerabilities

- `escape_shell_cmd()` in `cgi-src/util.c` allows the newline query in the CGI posts in Apache `httpd v1.0.3` or less, and NCSA `httpd v1.5` and earlier.

## Schedule

- **Writing Secure CGI's ✓**
- **Server Problems ✓**
- **Late Breaking News**

# Java and JavaScript

*Designing & Building Your Enterprise WWW Server*

*Java and JavaScript*

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## Schedule

- General Information
- Java
- JavaScript
- Issues
- Late Breaking News

## General Information

<http://www.netscape.com/eng/mozilla/Gold/handbook/javascript/>

Table 1:

JavaScript	Java
Interpreted (not compiled) by client	Compiled on server before execution on client.
Object-based. Code uses built-in, extensible objects, but no classes or inheritance.	Object-oriented. Applets consist of object classes with inheritance.
Code integrated with, and embedded in, HTML.	Applets distinct from HTML (accessed from HTML pages)
Variable data types not declared (loose typing)	Variable data types must be declared (strong typing).
Dynamic binding. Object references checked at run-time.	Static binding. Object references must exist at compile-time.
Secure. Cannot write to hard disk.	Secure. Cannot write to hard disk

## Schedule

- **General Information** ✓
- **Java**
- **JavaScript**
- **Issues**
- **Late Breaking News**



## Java

(caution: contents are hot!)

[<http://java.sun.com>]

- Object oriented, machine independent byte compiled language.
- Interpreted on the client side by the browser, ignored if not understood by the browser.
- Applet is referenced in HTML, downloaded if applicable.
- Strategic arrangements with Novell, Microsoft, IBM, Symantec, Adobe, Metrowerks, Spyglass, Macromedia, Oracle, and Netscape.

---

## Notes

## Java

(I'll sue you; it burned my fingers!)

[<http://java.sun.com>]

- **Java Developers Kit v1.0.2 availability Information (binary)**

<http://java.sun.com/JDK/products/JDK/index.html>

- **Online Documentation**

<http://java.sun.com/doc>

- **Java FAQ**

<http://java.sun.com/faq2.html>

- **Other Newsgroups**

<comp.lang.java>

---

## Notes

## Java - HelloWorld

```
import java.applet.*;
import java.awt.*;
import java.net.*;
import java.util.*;

public class HelloWorld extends java.applet.Applet {
 public void init() {
 resize(150,35);
 }
 public void paint(Graphics g) {
 g.drawString("Hello world!", 50, 25);
 }

 /**
 * The argument is the string to be displayed in the status message
 * area.
 */
 public void handleArg(String arg) {
 name = arg;
 }
}
```

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---

## Notes

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## Java - HelloWorld (cont.)

```
/**
 * The enter method displays the message in the status bar.
 */
public boolean enter() {
 while (true) {
 showStatus(name);
 }
}

/**
 * The exit method clears the status bar.
 */
public void exit() {
 showStatus(null);
}
}
```

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---

## Notes

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## Schedule

- General Information ✓
- Java ✓
- JavaScript
- Issues
- Late Breaking News

## JavaScript

(Lights up! Camera! OK, drink the coffee!)

<http://www.netscape.com/eng/mozilla/Gold/handbook/javascript/index.html>

- Compact scripting language embedded into HTML or available outside through CGI's
- It is a runtime system, not a compile-time program
- Uses <SCRIPT> and </SCRIPT> tags
- No strategic alliances yet
- Microsoft is competing with VBScript (not yet available)
- Other Newsgroups

`comp.lang.javascript`

# JavaScript - HelloWorld

(Curtains close. Lights down.)

```
<HTML>
<HEAD>
<SCRIPT LANGUAGE="JavaScript">
document.write("Hello World.")
</SCRIPT>
</HEAD>
```

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---

## Notes

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## Schedule

- **General Information** ✓
- **Java** ✓
- **JavaScript** ✓
- **Issues**
- **Late Breaking News**

## Issues

(stocks or bonds?)

- **Atlas (Netscape 3.0)** recognizes the alternate area in an applet; there is no such equivalent for JavaScript
- **JavaScript** is very shaky; has access to the local filesystem, can post information without the user knowing it
- **Java/JavaScript** is an all or nothing option; you cannot filter based on where the applet came from

## Schedule

- **General Information** ✓
- **Java** ✓
- **JavaScript** ✓
- **Issues** ✓
- **Late Breaking News**



# Appendices

# Appendix A

## Sample FTP Download Session

```
ace{jns}598: pwd
/local/src
ace{jns}599: ftp ftp.ncsa.uiuc.edu
Connected to ftp.ncsa.uiuc.edu.
220 curley FTP server (Version wu-2.4(25) Thu Aug 25 13:14:21 CDT 1994) ready.
Name (ftp.ncsa.uiuc.edu:jns): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password:jns@cisco.com
230-
230-Welcome to NCSA's new anonymous FTP server! I hope you find what you are
230- looking for. If you have any technical problems with the server,
230- please e-mail to ftpadmin@ncsa.uiuc.edu. For other questions regarding
230- NCSA software tools, please e-mail softdev@ncsa.uiuc.edu.
230-
230-The mail archive-server is no longer supported. Of course, if
230- you can read this, you don't need it anyway.
230-
230-
230-Note to HyperFTP users: If you log in, and cannot list directories
230- other than the top-level ones, enter a - as the first character of your
230- password (e-mail address).
230-
230-If your ftp client has problems with receiving files from this server, send
230- a - as the first character of your password (e-mail address).
230-
230-If you're ftp'ing from Delphi, please remember that the Delphi FTP client
230- requires you to enclose case-sensitive directory and file names in double
230- quote (") characters.
230-
230-You are user # 73 of an allowed 130 users.
230-
230-Please read the file README
230- it was last modified on Tue Jan 3 18:54:35 1995 - 472 days ago
230-Please read the file README.FIRST
230- it was last modified on Thu Jan 12 17:53:58 1995 - 463 days ago
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd Web/httpd/Unix/ncsa_httpd/current
250-Please read the file README
250- it was last modified on Sat Apr 6 14:27:34 1996 - 13 days ago
250 CWD command successful.
ftp> ls -l
227 Entering Passive Mode (141,142,3,75,6,107)
```

# Sample FTP Download Session (cont.)

150 Opening ASCII mode data connection for /bin/ls.

total 20750

```
drwxr-xr-x 2 19056 wsstaff 2048 Apr 5 18:30 .
drwxr-xr-x 8 12873 wheel 2048 Nov 10 12:48 ..
-rw-rw-r-- 1 19056 wsstaff 5232 Apr 6 15:27 README
-rwxr-xr-x 1 19056 wsstaff 186169 Apr 5 18:29 httpd_1.5.1-export_aix3.2.5.Z
-rw-r--r-- 1 19056 wsstaff 673760 Apr 5 18:29 httpd_1.5.1-export_aix3.2.5.tar.Z
-rwxr-xr-x 1 19056 wsstaff 396325 Apr 5 18:29 httpd_1.5.1-export_bsdi2.1.Z
-rw-r--r-- 1 19056 wsstaff 1271171 Apr 5 18:29 httpd_1.5.1-export_bsdi2.1.tar.Z
-rwxr-xr-x 1 19056 wsstaff 143692 Apr 5 18:29 httpd_1.5.1-export_hpux9.0.5.Z
-rw-r--r-- 1 19056 wsstaff 581959 Apr 5 18:29 httpd_1.5.1-export_hpux9.0.5.tar.Z
-rw-r--r-- 1 19056 wsstaff 312943 Apr 5 18:29 httpd_1.5.1-export_irix4.0.5.tar.Z
-rwxr-xr-x 1 19056 wsstaff 180338 Apr 5 18:29 httpd_1.5.1-export_irix5.3.Z
-rw-r--r-- 1 19056 wsstaff 629811 Apr 5 18:29 httpd_1.5.1-export_irix5.3.tar.Z
-rwxr-xr-x 1 19056 wsstaff 113227 Apr 5 18:29 httpd_1.5.1-export_linux1.2.13_ELF.Z
-rw-r--r-- 1 19056 wsstaff 523506 Apr 5 18:29 httpd_1.5.1-
export_linux1.2.13_ELF.tar.Z
-rwxr-xr-x 1 19056 wsstaff 202813 Apr 5 18:29 httpd_1.5.1-export_osf3.0.Z
-rw-r--r-- 1 19056 wsstaff 682197 Apr 5 18:29 httpd_1.5.1-export_osf3.0.tar.Z
-rwxr-xr-x 1 19056 wsstaff 122989 Apr 5 18:29 httpd_1.5.1-
export_solaris2.3_sparc.Z
-rw-r--r-- 1 19056 wsstaff 559384 Apr 5 18:29 httpd_1.5.1-
export_solaris2.3_sparc.tar.Z
-rwxr-xr-x 1 19056 wsstaff 121073 Apr 5 18:29 httpd_1.5.1-
export_solaris2.4_sparc.Z
-rw-r--r-- 1 19056 wsstaff 538814 Apr 5 18:29 httpd_1.5.1-
export_solaris2.4_sparc.tar.Z
-rwxr-xr-x 1 19056 wsstaff 120421 Apr 5 18:29 httpd_1.5.1-export_solaris2.4_x86.Z
-rw-r--r-- 1 19056 wsstaff 540018 Apr 5 18:29 httpd_1.5.1-
export_solaris2.4_x86.tar.Z
-rw-r--r-- 1 19056 wsstaff 313059 Apr 5 18:29 httpd_1.5.1-export_source.tar.Z
-rwxr-xr-x 1 19056 wsstaff 278669 Apr 5 18:29 httpd_1.5.1-export_sunos4.1.3.Z
-rw-r--r-- 1 19056 wsstaff 725051 Apr 5 18:29 httpd_1.5.1-export_sunos4.1.3.tar.Z
-rwxr-xr-x 1 19056 wsstaff 258201 Apr 5 18:29 httpd_1.5.1-export_ultrix4.3.Z
-rw-r--r-- 1 19056 wsstaff 1121785 Apr 5 18:30 httpd_1.5.1-export_ultrix4.3.tar.Z
```

226 Transfer complete.

ftp> **get httpd\_1.5.1-export\_source.tar.Z**

227 Entering Passive Mode (141,142,3,75,6,118)

150 Opening BINARY mode data connection for httpd\_1.5.1-export\_source.tar.Z (313059 bytes).

226 Transfer complete.

313059 bytes received in 58.5 secs (5351 bytes/sec)

ftp> **quit**

221 Goodbye.

ace{jns}600:

# Appendix B

## Contents of the NCSA 1.5.1 Archive

```

ace{jns}603: zcat httpd_1.5.1-export_source.tar.Z | tar tvf -
drwxr-xr-x 524/1 0 Apr 5 15:14 1996 httpd_1.5.1-export/
-rw-r--r-- 524/1 1880 Apr 5 11:41 1996 httpd_1.5.1-export/BUGS
-rw-r--r-- 524/1 11532 Apr 5 11:41 1996 httpd_1.5.1-export/CHANGES
-rw-r--r-- 524/1 3251 Apr 5 11:41 1996 httpd_1.5.1-export/COPYRIGHT
-rw-r--r-- 524/1 4956 Apr 5 11:41 1996 httpd_1.5.1-export/CREDITS
-rw-r--r-- 524/1 1838 Apr 5 11:41 1996 httpd_1.5.1-export/Makefile
-rw-r--r-- 524/1 3442 Apr 5 11:41 1996 httpd_1.5.1-export/README
drwxr-xr-x 524/1 0 Apr 5 12:54 1996 httpd_1.5.1-export/cgi-bin/
-rwxr-xr-x 524/1 379 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/archie
-rwxr-xr-x 524/1 478 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/calendar
-rwxr-xr-x 524/1 151 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/date
-rwxr-xr-x 524/1 45 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/donothing
-rwxr-xr-x 524/1 454 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/finger
-rwxr-xr-x 524/1 172 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/fortune
-rwxr-xr-x 524/1 13231 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/mail
-rwxr--r-- 524/1 5157 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/nph-error.pl
-rwxr-xr-x 524/1 736 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/nph-test-cgi
-rwxr-xr-x 524/1 3277 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/redirect
-rwxr-xr-x 524/1 721 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/test-cgi
-rwxr-xr-x 524/1 1472 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/test-cgi.tcl
-rwxr-xr-x 524/1 49 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/test-env
-rwxr-xr-x 524/1 165 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/uptime
-rwxr-xr-x 524/1 2682 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-bin/wais.pl
drwxr-xr-x 524/1 0 Apr 5 12:54 1996 httpd_1.5.1-export/cgi-src/
-rw-r--r-- 524/1 1208 Apr 5 12:50 1996 httpd_1.5.1-export/cgi-src/Makefile
-rw-r--r-- 524/1 5253 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/change-
passwd.c
-rw-r--r-- 524/1 11983 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/imagemap.c
-rw-r--r-- 524/1 10053 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/jj.c
-rwxr-xr-x 524/1 7185 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/phf.c
-rw-r--r-- 524/1 1603 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/post-query.c
-rwxr-xr-x 524/1 1435 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/query.c
-rw-r--r-- 524/1 2972 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/util.c
-rw-r--r-- 524/1 374 Apr 5 11:41 1996 httpd_1.5.1-export/cgi-src/util.h
drwxr-xr-x 524/1 0 Apr 5 11:41 1996 httpd_1.5.1-export/conf/
-rw-r--r-- 524/1 1549 Apr 5 11:41 1996 httpd_1.5.1-export/conf/access.conf-dist
-rw-r--r-- 524/1 9825 Apr 5 11:41 1996 httpd_1.5.1-export/conf/httpd.conf-dist
-rw-r--r-- 524/1 1497 Apr 5 11:41 1996 httpd_1.5.1-export/conf/
localhost_srm.conf-dist
-rw-r--r-- 524/1 3319 Apr 5 11:41 1996 httpd_1.5.1-export/conf/mime.types
-rw-r--r-- 524/1 6404 Apr 5 11:41 1996 httpd_1.5.1-export/conf/srm.conf-dist
drwxr-xr-x 524/1 0 Apr 5 11:41 1996 httpd_1.5.1-export/icons/
-rw-r--r-- 524/1 506 Apr 5 11:41 1996 httpd_1.5.1-export/icons/back.xbm

```

# Contents of the NCSA 1.5.1 Archive

## (cont.)

```

-rw-r--r-- 524/1 83 Apr 5 11:41 1996 httpd_1.5.1-export/icons/ball.gif
-rw-r--r-- 524/1 437 Apr 5 11:41 1996 httpd_1.5.1-export/icons/ball.xbm
-rw-r--r-- 524/1 134 Apr 5 11:41 1996 httpd_1.5.1-export/icons/binary.gif
-rw-r--r-- 524/1 533 Apr 5 11:41 1996 httpd_1.5.1-export/icons/binary.xbm
-rw-r--r-- 524/1 509 Apr 5 11:41 1996 httpd_1.5.1-export/icons/blank.xbm
-rw-r--r-- 524/1 83 Apr 5 11:41 1996 httpd_1.5.1-export/icons/blue_ball.gif
-rw-r--r-- 524/1 128 Apr 5 11:41 1996 httpd_1.5.1-export/icons/ftp.gif
-rw-r--r-- 524/1 524 Apr 5 11:41 1996 httpd_1.5.1-export/icons/ftp.xbm
-rw-r--r-- 524/1 83 Apr 5 11:41 1996 httpd_1.5.1-export/icons/green_ball.gif
-rw-r--r-- 524/1 231 Apr 5 11:41 1996 httpd_1.5.1-export/icons/image.gif
-rw-r--r-- 524/1 509 Apr 5 11:41 1996 httpd_1.5.1-export/icons/image.xbm
-rw-r--r-- 524/1 104 Apr 5 11:41 1996 httpd_1.5.1-export/icons/index.gif
-rw-r--r-- 524/1 530 Apr 5 11:41 1996 httpd_1.5.1-export/icons/index.xbm
-rw-r--r-- 524/1 115 Apr 5 11:41 1996 httpd_1.5.1-export/icons/menu.gif
-rw-r--r-- 524/1 527 Apr 5 11:41 1996 httpd_1.5.1-export/icons/menu.xbm
-rw-r--r-- 524/1 125 Apr 5 11:41 1996 httpd_1.5.1-export/icons/movie.gif
-rw-r--r-- 524/1 530 Apr 5 11:41 1996 httpd_1.5.1-export/icons/movie.xbm
-rw-r--r-- 524/1 83 Apr 5 11:41 1996 httpd_1.5.1-export/icons/red_ball.gif
-rw-r--r-- 524/1 129 Apr 5 11:41 1996 httpd_1.5.1-export/icons/sound.gif
-rw-r--r-- 524/1 530 Apr 5 11:41 1996 httpd_1.5.1-export/icons/sound.xbm
-rw-r--r-- 524/1 127 Apr 5 11:41 1996 httpd_1.5.1-export/icons/telnet.gif
-rw-r--r-- 524/1 533 Apr 5 11:41 1996 httpd_1.5.1-export/icons/telnet.xbm
-rw-r--r-- 524/1 130 Apr 5 11:41 1996 httpd_1.5.1-export/icons/text.gif
-rw-r--r-- 524/1 511 Apr 5 11:41 1996 httpd_1.5.1-export/icons/text.xbm
-rw-r--r-- 524/1 132 Apr 5 11:41 1996 httpd_1.5.1-export/icons/unknown.gif
-rw-r--r-- 524/1 515 Apr 5 11:41 1996 httpd_1.5.1-export/icons/unknown.xbm
drwxr-xr-x 524/1 0 Apr 5 12:54 1996 httpd_1.5.1-export/src/
-rw-r--r-- 524/1 1855 Apr 5 11:41 1996 httpd_1.5.1-export/src/FEATURE_REQUESTS
-rw-r--r-- 524/1 5040 Apr 5 11:41 1996 httpd_1.5.1-export/src/HTTP_HEADERS
-rw-r--r-- 524/1 4594 Apr 5 11:41 1996 httpd_1.5.1-export/src/HTTPD_REQ_PATH
-rw-r--r-- 524/1 9439 Apr 5 12:31 1996 httpd_1.5.1-export/src/Makefile
-rw-r--r-- 524/1 5674 Apr 5 11:43 1996 httpd_1.5.1-export/src/allocate.c
-rw-r--r-- 524/1 1666 Apr 5 11:43 1996 httpd_1.5.1-export/src/allocate.h
-rw-r--r-- 524/1 4539 Apr 5 11:43 1996 httpd_1.5.1-export/src/blackout.c
-rw-r--r-- 524/1 746 Apr 5 11:43 1996 httpd_1.5.1-export/src/blackout.h
-rw-r--r-- 524/1 21172 Apr 5 12:01 1996 httpd_1.5.1-export/src/cgi.c
-rw-r--r-- 524/1 1243 Apr 5 11:43 1996 httpd_1.5.1-export/src/cgi.h
-rw-r--r-- 524/1 6069 Apr 5 12:01 1996 httpd_1.5.1-export/src/config.h
-rw-r--r-- 524/1 10356 Apr 5 12:01 1996 httpd_1.5.1-export/src/constants.h
-rw-r--r-- 524/1 1573 Apr 5 11:43 1996 httpd_1.5.1-export/src/debug.c
-rw-r--r-- 524/1 9001 Apr 5 11:43 1996 httpd_1.5.1-export/src/digest.c
-rw-r--r-- 524/1 552 Apr 5 11:43 1996 httpd_1.5.1-export/src/digest.h
-rw-r--r-- 524/1 4946 Apr 5 11:43 1996 httpd_1.5.1-export/src/env.c

```

# Contents of the NCSA 1.5.1 Archive (cont.)

```
-rw-r--r-- 524/1 1233 Apr 5 11:43 1996 httpd_1.5.1-export/src/env.h
-rw-r--r-- 524/1 5967 Apr 5 11:43 1996 httpd_1.5.1-export/src/fdwrap.c
-rw-r--r-- 524/1 1610 Apr 5 11:43 1996 httpd_1.5.1-export/src/fdwrap.h
-rw-r--r-- 524/1 1222 Apr 5 11:43 1996 httpd_1.5.1-export/src/global.h
-rw-r--r-- 524/1 8871 Apr 5 11:43 1996 httpd_1.5.1-export/src/host_config.c
-rw-r--r-- 524/1 29244 Apr 5 12:04 1996 httpd_1.5.1-export/src/http_auth.c
-rw-r--r-- 524/1 1997 Apr 5 11:43 1996 httpd_1.5.1-export/src/host_config.h
-rw-r--r-- 524/1 166669 Apr 5 12:02 1996 httpd_1.5.1-export/src/http_access.c
-rw-r--r-- 524/1 965 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_access.h
-rw-r--r-- 524/1 4014 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_alias.c
-rw-r--r-- 524/1 1605 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_alias.h
-rw-r--r-- 524/1 2075 Apr 5 12:05 1996 httpd_1.5.1-export/src/http_auth.h
-rw-r--r-- 524/1 45341 Apr 5 12:06 1996 httpd_1.5.1-export/src/http_config.c
-rw-r--r-- 524/1 1816 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_config.h
-rw-r--r-- 524/1 20438 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_dir.c
-rw-r--r-- 524/1 2115 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_dir.h
-rw-r--r-- 524/1 25144 Apr 5 12:07 1996 httpd_1.5.1-export/src/http_include.c
-rw-r--r-- 524/1 1218 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_include.h
-rw-r--r-- 524/1 7484 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_ipc.c
-rw-r--r-- 524/1 750 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_ipc.h
-rw-r--r-- 524/1 21464 Apr 5 12:07 1996 httpd_1.5.1-export/src/http_log.c
-rw-r--r-- 524/1 2275 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_log.h
-rw-r--r-- 524/1 10139 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_mime.c
-rw-r--r-- 524/1 1619 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_mime.h
-rw-r--r-- 524/1 20000 Apr 5 12:09 1996 httpd_1.5.1-export/src/http_request.c
-rw-r--r-- 524/1 1488 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_request.h
-rw-r--r-- 524/1 17582 Apr 5 12:10 1996 httpd_1.5.1-export/src/http_send.c
-rw-r--r-- 524/1 1254 Apr 5 11:43 1996 httpd_1.5.1-export/src/http_send.h
-rw-r--r-- 524/1 33206 Apr 5 12:13 1996 httpd_1.5.1-export/src/httpd.c
-rw-r--r-- 524/1 1810 Apr 5 11:43 1996 httpd_1.5.1-export/src/httpd.h
-rw----- 524/1 1710 Apr 5 11:42 1996 httpd_1.5.1-export/src/httpd.man
-rw-r--r-- 524/1 39724 Apr 5 11:43 1996 httpd_1.5.1-export/src/httpyp.h
-rw-r--r-- 524/1 11117 Apr 5 13:25 1996 httpd_1.5.1-export/src/imagemap.c
-rw-r--r-- 524/1 1201 Apr 5 11:43 1996 httpd_1.5.1-export/src/imagemap.h
-rw-r--r-- 524/1 4931 Apr 5 11:43 1996 httpd_1.5.1-export/src/md5.c
-rw-r--r-- 524/1 1414 Apr 5 11:43 1996 httpd_1.5.1-export/src/md5.h
-rw-r--r-- 524/1 10375 Apr 5 11:43 1996 httpd_1.5.1-export/src/md5c.c
-rw-r--r-- 524/1 4964 Apr 5 11:43 1996 httpd_1.5.1-export/src/open_logfile.c
-rw-r--r-- 524/1 830 Apr 5 11:43 1996 httpd_1.5.1-export/src/open_logfile.h
-rw-r--r-- 524/1 14022 Apr 5 11:43 1996 httpd_1.5.1-export/src/portability.h
-rw-r--r-- 524/1 4957 Apr 5 11:43 1996 httpd_1.5.1-export/src/rfc931.c
-rw-r--r-- 524/1 32215 Apr 5 12:14 1996 httpd_1.5.1-export/src/util.c
-rw-r--r-- 524/1 3271 Apr 5 12:14 1996 httpd_1.5.1-export/src/util.h
drwxr-xr-x 524/1 0 Apr 5 12:54 1996 httpd_1.5.1-export/support/
```

# Contents of the NCSA 1.5.1 Archive (cont.)

```
-rwxr-xr-x 524/1 2820 Apr 5 14:03 1996 httpd_1.5.1-export/support/Makefile
-rw-r--r-- 524/1 1095 Apr 5 11:42 1996 httpd_1.5.1-export/support/README
-rw-r--r-- 524/1 2669 Apr 5 11:42 1996 httpd_1.5.1-export/support/README.change-
passwd
-rw-r--r-- 524/1 2990 Apr 5 11:42 1996 httpd_1.5.1-export/support/change-
passwd.readme
-rw-r--r-- 524/1 1565 Apr 5 11:42 1996 httpd_1.5.1-export/support/dbm2std.c
-rw-r--r-- 524/1 4387 Apr 5 11:42 1996 httpd_1.5.1-export/support/dbmdigest.c
-rw-r--r-- 524/1 8494 Apr 5 11:42 1996 httpd_1.5.1-export/support/dbmgroup.c
-rw-r--r-- 524/1 8058 Apr 5 11:42 1996 httpd_1.5.1-export/support/dbmpasswd.c
-rw-r--r-- 524/1 594 Apr 5 11:42 1996 httpd_1.5.1-export/support/htdigest.c
-rw-r--r-- 524/1 4205 Apr 5 11:42 1996 httpd_1.5.1-export/support/htpasswd.c
-rw-r--r-- 524/1 2586 Apr 5 11:42 1996 httpd_1.5.1-export/support/inc2shtml.c
-rw-r--r-- 524/1 2131 Apr 5 11:42 1996 httpd_1.5.1-export/support/std2dbm.c
-rw-r--r-- 524/1 2043 Apr 5 11:42 1996 httpd_1.5.1-export/support/unescape.c
-rw-r--r-- 524/1 4572 Apr 5 14:59 1996 httpd_1.5.1-export/support/webgrab.c
drwxr-xr-x 524/1 0 Apr 5 11:42 1996 httpd_1.5.1-export/support/auth/
-rwxr-xr-x 524/1 1019 Apr 5 11:42 1996 httpd_1.5.1-export/support/auth/pgp-dec
-rwxr-xr-x 524/1 552 Apr 5 11:42 1996 httpd_1.5.1-export/support/auth/pgp-enc
-rwxr-xr-x 524/1 956 Apr 5 11:42 1996 httpd_1.5.1-export/support/auth/ripem-dec
-rwxr-xr-x 524/1 922 Apr 5 11:42 1996 httpd_1.5.1-export/support/auth/ripem-enc
-rw-r--r-- 524/1 4943 Apr 5 11:42 1996 httpd_1.5.1-export/support/auth/
uudecode.c
-rw-r--r-- 524/1 4012 Apr 5 11:42 1996 httpd_1.5.1-export/support/auth/
uuencode.c
ace{jns}604:
```

# Appendix C - Building an NCSA Server

```
% zcat httpd_1.5.1-export_source.tar.Z | tar tvf -
httpd_1.5.1-export/
...
httpd_1.5.1-export/support/auth/uuencode.c
% cd httpd_1.5.1-export
% make
Please choose a system type.
Valid types are aix3, aix4, sunos, sgi4, sgi5,
hp-cc, hp-gcc, solaris, netbsd, svr4, linux,
next, ultrix, osf1, aux, bsdi
If you do not have one of these systems, you must edit
src/Makefile, src/portability.h, src/config.h,
cgi-src/Makefile, and support/Makefile
ace(jns)611: make sunos
cd src ; make sunos ; cd ../cgi-src ; make sunos ; cd ../support ; make sunos
make tar AUX_CFLAGS=-DSUNOS4 CC=gcc
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT httpd.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_config.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_request.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT util.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_dir.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_alias.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_log.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_mime.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_access.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_auth.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_send.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT cgi.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_include.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT rfc931.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT imagemap.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT http_ipc.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT digest.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT md5.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT md5c.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT env.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT host_config.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT fdwrap.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT open_logfile.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT allocate.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT debug.c
gcc -c -g -DSUNOS4 -DDIGEST_AUTH -DDBM_SUPPORT blackout.c
```



# Building an NCSA Server (cont.)

```
gcc -o ../httpd httpd.o http_config.o http_request.o util.o http_dir.o http_alias.o
http_log.o http_mime.o http_access.o http_auth.o http_send.o cgi.o http_include.o
rfc931.o imagemap.o http_ipc.o digest.o md5.o md5c.o env.o host_config.o fdwrap.o
open_logfile.o allocate.o debug.o blackout.o
make all CC=gcc
gcc -c -g query.c
gcc -c -g util.c
gcc query.o util.o -o ../cgi-bin/query
gcc -c -g post-query.c
gcc post-query.o util.o -o ../cgi-bin/post-query
gcc -c -g imagemap.c
gcc imagemap.o -o ../cgi-bin/imagemap
gcc -c -g jj.c
gcc jj.o util.o -o ../cgi-bin/jj
gcc -c -g phf.c
gcc phf.o util.o -o ../cgi-bin/phf
make all CC=gcc CFLAGS="-DSUNOS"
gcc -DSUNOS -I../src htpasswd.c -o htpasswd
htpasswd.c: In function `add_password':
htpasswd.c:99: warning: passing arg 1 of `strd' makes pointer from integer without a cast
htpasswd.c:100: warning: passing arg 2 of `strcmp' makes pointer from integer without a
cast
htpasswd.c:108: warning: assignment makes pointer from integer without a cast
gcc -DSUNOS -I../src unescape.c -o unescape
gcc -DSUNOS -I../src inc2shtml.c -o inc2shtml
gcc -c -DSUNOS -I../src htdigest.c
gcc -DSUNOS -o htdigest htdigest.o ../src/md5.o ../src/md5c.o
gcc -DSUNOS -I../src dbm2std.c -o dbm2std
gcc -DSUNOS -I../src std2dbm.c -o std2dbm
gcc -c -DSUNOS -I../src dbmdigest.c
dbmdigest.c: In function `add_password':
dbmdigest.c:96: warning: passing arg 1 of `strd' makes pointer from integer without a
cast
dbmdigest.c:97: warning: passing arg 2 of `strcmp' makes pointer from integer without a
cast
dbmdigest.c:105: warning: assignment makes pointer from integer without a cast
gcc -DSUNOS -o dbmdigest dbmdigest.o ../src/md5.o ../src/md5c.o
gcc -DSUNOS -I../src dbmgroup.c -o dbmgroup
gcc -DSUNOS -I../src dbmpasswd.c -o dbmpasswd
dbmpasswd.c: In function `get_passwd':
dbmpasswd.c:128: warning: passing arg 1 of `strd' makes pointer from integer without a
cast
dbmpasswd.c:130: warning: passing arg 2 of `strcmp' makes pointer from integer without
a cast
dbmpasswd.c:134: warning: assignment makes pointer from integer without a cast
gcc -DSUNOS -I../src webgrab.c -o webgrab
ace{jns}612:
```