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Title:

TELEDATA

Utility program TELESTATAC

A/S REGNECENTRALEN

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Abstract: This manual describes how to activate the TELEDATA utility program TELESTATAC. It also, in some examples, show how to use the output.

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CONTENTS

0. TELESTATAC 0.

Telestatac is a program designed for statistical analysis of the times and segment transports going into the processing of a transaction in a real-time system, on-line or off-line.

The results coming from an activitated Telestatac might be used for "fine tuning" the system, or examining the processing of the individual transaction types, etc.

Telestatac may also be employed in other systems which run as transaction-oriented systems. The results will then have to be interpreted slightly different, though. It all depends on the type of data used as input.

In version 1 of Telestatac, which is the first, it is only possible to read in a logfile if it is located on disc. This is not always expedient and will probably also be amended in a later version.

1. EXAMPLES 1.

Ex. 1.1: telestatac transint.start.end 1.1

The statistics records are fetched from the file logfile. All transactions in this file will be processed and the 1. part of the analysis executed.

Ex. 1.2: telestatac file.helpfile timeint.15.30.00.3600 sort.term 1.2

The statistics records are fetched from the file helpfile, which must have a blocklength acceptable to the bs-system.

The analysis begins with the transaction, which has 15.30.00 as its time of arrival, and covers one hour (= 3600 sec.).

In the second part of the analysis the transactions are grouped on terminals.

2. CALL 2.

Telestatac is activated with the FP-command below:

```
                  ( transint.<start>.<end>          )1
                  ( timeint.<start time>.<interval> )1
                  (                                 )
                  (      ( no    )1                 )
                  ( sort.( trans )                  )*
                  (      ( term  )1                 )
                  (                                 )
                  ( file.<bs_area_name>             )
                  (                                 )
telestatac        ( in.<infile>                     )0
```

3. A DESCRIPTION OF PARAMETERS

3.1 Normal Parameters

```
transint.<start>.<end>
```

<start>::= { start | <first trans> } 1 1

<end>::= { end | <last trans> } 1 1

states which transaction interval the analysis is to deal with:

start : From the first transaction in the file.

<first trans> : Begins with the transaction with this number.

end : To the last transaction in the file.

<last trans> : Ends with the transaction with this number.

No standard value has been defined.

```
timeint.<start time>.<interval>
```

<start time>::= { { <hour>. } 1 0 <minute>. } 1 0 <sec>

<interval>::= <no of sec>

As the parameter described above this one also states which interval the analysis is to deal with:

<start time>: The time the analysis starts stated in hours.minutes.seconds. The first transaction encountered after <start time> will be the first one in the analysis.

<no of sec>: The number of seconds the analysis must cover. The last transaction in the analysis will be one encoun-

tered immediately before time is out.
No standard value has been defined.

```
          no
sort.     trans
          term
```

states in which manner the second part of the analysis is to be executed:
no : Only the first part of the analysis is executed.
trans: The individual transaction codes are analysed.
term : The individual terminals are analysed.
Standard value: no

```
file.<bs_area_name>
```

states the name of the file containing the statistics records.
Standard value: logfile

```
in.<infile>
```

states where the program may fetch the rest of the FP-parameters.
No standard value has been defined.

3.2 Parameters for debugging 3.2

Apart from the parameters described above, there exist some parameters, listed below, which are used for debugging telestatac:

1) test
2) testout
3) testa, testb,....., testf

Use of these parameters is advised against, as some of them produce enormous amounts of output.

It is worth mentioning that by using testb.22 it is possible to have the individual transactions printed out as they are incorporated in the analysis. A line, of the format below, is printed for each transaction:

TRANS <trans code> <record type> <trans no> <user no> <terminal no> <date> <time of arrival at duetcom = arrtime1> <time of arrival at teleop = arrtime2> <time of departure from teleop = deptime> <cpu excl readgeneral> <cpu incl readgeneral> <length of queue> <algol segm> <duet segm> <data segm>

3.3 Additional requirement on the parameters 3.3

There are some additional requirements on the FP-parameters, apart from those already described:

<first trans> : Greater than 0
<last trans> : Less than 100 000
<start time>+<intervals>: Less than 23.59.59
transint or timeint must be stated, but not both.

4. FUNCTION

4.1 Introduction

Telestatac fetches information on the individual transactions (see page 13) in the logfile or in the file specified in the FP-parameter FILE. Using this information, it produces a statistical analysis covering the following items:

interval of arrival
cpu time
processing time
waiting time
response time

the number of transactions in the queue at Duetcom when a transaction arrives at Teleop (henceforth called 'length of queue')

algolsegment transports
duetsegment transports
datasegment transports to/from cf- and sq-files

4.2 The Transaction as a Population in Part 1 and Part 2.

The analysis falls in two parts. The first part is always executed, and all transactions are here processed collectively.

The second part of the analysis deals with transactions from one terminal, or transactions belonging to a transcode, as constituting a population of their own. If the second part is to be used, it is stated in the FP-parameter SORT, which simultaneously states the type of analysis to be executed. Transcode is the code given to a transaction by the user.

4.3 The measurements in part 1 and part 2 4.3

In the first part of the analysis a grouped distribution of the measurements is printed out on the first page, and on the second page a comparison with a gamma distribution is printed.

In the second part of the analysis a grouped distribution for each population is printed out.

For each type of measurement made, a grouped distribution, based on a fixed scale, is made, likewise the total number of observations and the minimum and maximum values are identified, and the mean and the standard deviation are calculated (the calculation method is described p. 20) Regarding cpu- and processing time the total amount of time used is calculated as well.

For use in connection with the gamma distribution a shape- and scale parameter is calculated, and a position parameter is identified.

4.4 Measurements Calculation 4.4

The measurements are calculated on the basis of the following formulae, with the names refering to 4.5.

Interval between the arrivals of two transactions (n and the one preceding n):

$$(\text{log\_arrtime1}_n - \text{log\_arrtime1}_{n-1})/10000$$

cpu-time : log_cpuincl/1000

processing time: (log_deptime - log_arrtime2)/100
+(log_cpuincl - log_cpuexcl)/1000

waiting time : log_arrtime2/100 - logarrtime1/10000

response time : log_deptime/100 - log_arrtime1/10000

length of queue : log_queuelength

algolsegments : $log\_algolsegm_n$ - $log\_algolsegm_{n-1}$

duetsegments : $log\_duetsegm_n$ - $log\_duetsegm_{n-1}$

datasegments : $log\_datasegm_n$ - $log\_datasegm_{n-1}$

4.5 Description of A Statistics Record 4.5

Input to telestatac is a number of records with the structure outlined below:

adr.	name	type	function
2	l_length	word	record length
4	l_checksum	word	checksum
6	l_xrectype	word	recordtype for statistics:7405
8	l_xfile_serno	word	
9	l_xdboperation	halfword	
10	l_xsetstate	halfword	
12	l_xfilepos	word	
14	l_xuser	word	usernumber
16	l_xterminal	word	terminal number≤100
18	l_xtrans_serno	word	the serial no of the transaction
20	l_xlog_serno	word	
22	l_xerror	word	
24	l_xisodate	word	date on the short clock form
26	l_xfiletype	word	
36	l_xfilename	text	10 halfwords
38	log_transcode	word	transaction code

40	log_printbytes	word	
44	log_arrtime1	long	arrival at duetcom in 1/10 msec
48	log_arrtime2	long	arrival at teleop in 1/100 sec, after read-general
52	log_deptime	long	departure from teleop in 1/100 sec.
54	log_cpuexcl	word	cputime excl read-general in msec
56	log_cpuincl	word	cputime incl read-general in msec
58	log_actterm	word	
60	log_queuelength	word	length of queue at arrival at duetcom
62	log_algolsegm	word	summed up algol-segment transports
64	log_duetsegm	word	summed up duet-segment transports
66	log_datasegm	word	summed up data-segment transports

If time of arrival at Duetcom (log_arrtime1) equals time of arrival at Teleop (log-arrtime2) telestatac will interpret the transactions as being produced off-line, and the log-arrtime1 will be stated in 1/100 sec.

It is not necessary to extract records of the statistics type from the logfile before telestatac is activated, as the software itself performs the extraction.

If the extraction has been executed the file created must comply with the requirements of the BS-system. This means a.o. that the records must contain a checksum and the file have an acceptable blocklength.

5. REQUIREMENTS 5.

SIZE:

(18000+1024*(no of segm pr block in infile)) halfword

AREA:

min 5

BUF :

10-20

The demands made on temporary segments, entries, and cpu-time depend on whether both parts of the analysis are carried out, and whether the transactions are produced offline or online. The relations are outlined in the table below.

		temp.segm.	entries	CPU in sec.
1.part	online	2*(no_of_trans*70)/512	5	5+.035*no_of_trans
	offline	none	3	5+.025*no_of_trans
1. and 2.part	online	3*(no_of_trans*70)/512	6	5+.065*no_of_trans+.8*fkt
	offline	2*(no_of_trans*70)/512	5	5+.055*no_of_trans+.8*fkt

fkt depends on whether the second part is grouped after transactioncode or terminalnumber.

transactioncode: fkt = no_of_transcodes
terminalnumber : fkt = no_of_terminals

6. DESCRIPTION OF OUTPUT 6.

A run results in two different types of pages: one with a grouped distribution and one with a comparison with a gamma distribution.

First part of the analysis outputs one page with a grouped distribution and another one with a comparison. The second part outputs a page with a grouped distribution for each transactioncode or terminalno.

6.1 Both types begin with a head, containing global data (see example 6.1 p. 28). 6.1

1. date as YY MM DD
   (e.g. DATE 78 09 21)
2. time of start i.e. time of arrival of first transaction at Duetcom, as HH MM SS
   (e.g. START 18 16 00)
3. termination, i.e. time of departure of last transaction from Teleop, as HH MM SS
   (e.g. FINISH 18 18 04)
4. the number of seconds the analysis covers, time of termination ÷ time of start
   (e.g. ELAPSED 124 SEC.)
5. the number of transactions the analysis comprises.
   (e.g. NO OF TRANSACTIONS 99)
6. the number of terminals the transactions come from
   (e.g. FROM 2 TERMINALS)

6.2 Identifying of the Transaction Population 6.2

Then follows a line stating which transactions form the basis for

the succeeding table. There are 3 different texts:

1. FROM TRANSNO X TO TRANSNO Y
   i.e. all transactions between X and Y, including both X and Y
   (see the example 6.1 p. 28)
2. WITH LINECODE qqq
   i.e. all transactions with the transactioncode qqq
   (see the example 6.3 p. 30)
3. FROM TERMINALNO. A USERNO. B
   i.e. all transactions which have come from terminalno A
   (see the example 6.4 p. 31).

This line furthermore indicates whether the transactions have been produced offline or online.

6.3 Grouped Distribution

6.3.1 The mainbody of information consists of a number of columns: One or two for each grouped measurement, plus four scales. The column numbers used below correspond to the columnnumbers of example 6.1. In fact the examples are taken from example 6.1 p. 28. 6.3.1

A1 logarithmic timescale in seconds indicating the grouping of arrival intervals. The scale is divided into 30 classes (0.07-316.23)

A2 grouping of the arrival intervals of the transactions. This grouping is organised, so that the number of transactions, printed on the same line as a class borderline belongs to the class, which begins at the preceding borderline and goes to and includes the borderline in question.

Example 6.5: there were 3 transactions with an interval of arrival between 1.78 sec. to, and including 2.37 sec.

All transactions with an arrival interval from 0 to, and including 0.07 sec. are placed in the lower class.

All transactions with an arrival interval larger than the upper class borderline (316.23 sec) are placed in the upper class.

A3 the ratio between the number of transactions in this class and the total amount of transactions, expressed in per cent.

Example 6.6: 3 transactions ~ 3.0%

A4 Scale for grouping of queue length by arrival of Teleop

A5 grouping of observations of the queue length

Example 6.7: On 99 occassions the length of the of the queue was 0. That the length of the queue in all observations is 0, is due to the fact that all the transactions were produced offline.

Everything discussed in A2 in connection with upper-class apply here as well.

A6 logarithmic timescale in seconds for grouping of cpu-, processing-, waiting-, and responsetime. This timescale will always be identical with the other one in A1.

A7 and A8 grouping of observations of cpu-times (for a description see A2 and A3)

A9 and A10 grouping of observations of processing times (for a description see A2 and A3)

A11 and A12 grouping of observations of waiting times (for a description see A2 and A3)

A13 and A14 grouping of observations of response times. (for a description see A2 and A3)

A15 scale for grouping of algol-, duet-, and datasegment transports

A16 grouping of algolsegment transports

Example 6.8: 0 transactions have each effected 15 algolsegment transports.

Re upper class, see A2

A17 grouping of duetsegment transports.

Example 6.9: 2 transactions have each effected 29 or more duetsegment transports cf. A2

A18 grouping of datasegment transports.

The following examples will be used to throw light on the use of the table "grouped distribution" p. 28.

Example 6.10: How many transactions had an interval of arrival falling in the span between 0.75 and 1 sec.?

Start in the timescale A1 at 1.0. Follow this line till column A2, NO OF TRANS, is reached. The number of transactions is here 32, corresponding to a percentage of 32.3, as stated in column A3.

Example 6.11: How many transactions had a cpu-time consumption of between 0.18 sec and 0.24 sec.?

Start in the second timescale A6 at 0.24. Follow this line till column A7, NO OF TRANS, is reached. The number of transactions is here 16, corresponding to a percentage of 16.2, as stated in column A8.

Example 6.12: Processing times, waiting times and response times are found by applying the method described under example 6.11 to the relevant columns.

Example 6.13: How many transactions effected 4 algolsegment transports?

Start at 4 in column A15, NO OF SEGM. Follow this line till column A16, NO OF TRANS, is reached; the number of transactions is here 2.

Example 6.14: How many transactions effected 29 or more datasegment transports?

Start at 29 in column A15, NO OF SEGM. Follow this line till column A18, NO OF TRANS, in the DATA column; the number of transactions is here 6.

6.3.2 For each grouped measurement the base contains information about the values listed below:

- The total amount of transactions

- Minimum and maximum values
  In connection with the measurements arrival interval, algol-, duet-, and datasegment transports, the minimum value may differ from the one, which can be found in the grouping. This is due to the fact that for these measurements the first observation after the start of the machine, or the analysis, has been set to zero, and thus does not play a part in the statistical analysis, but still appears in the grouping.

- The mean. The geometrical average: $(\Sigma X_i)/N$

- Standard deviation. Standard deviation is calculated using the following formula: $(\Sigma X_i^2 - (\Sigma X_i)^2/N)/(N-1)$

Example 6.15: For the cpu-time (p. 28) the following values will be found.

TOTAL	99
MIN.	0.10
MAX.	4.80
AVERG.	0.55
DEV.	0.84

6.3.3 Then follows a line (BUSY) stating the total cpu-time consumption in seconds, then follows the same number in per cent of elapsed time. Next is the complete processing time in seconds and this number in per cent of elapsed time. 6.3.3

Example 6.16: On p. 28 it will be seen that the total cpu-time is 54 sec. corresponding to 43.8%, and the complete processing time is 123 sec. corresponding to 99.1%.

6.3.4 The last line contains information about: 6.3.4

1. How many terminals have provided transactions for the table.

Example 6.17 p. 28: ARRIVAL FROM 2 TERMINALS

2. The average number of transactions arriving each second.

Example 6.18 p. 28: 0.8101 TRANS/SEC

3. The average length of time elapsing between two transactions from one terminal.

Example 6.19 p. 28: 2.4689 SEC/TRANS/TERMINAL

4. The average number of transactions arriving each second from one terminal.

Example 6.20 p. 28: 0.4050 TRANS/SEC/TERMINAL

6.4 Comparison with a gammadistribution

6.4

6.4.1 This mainbody consists of a number of columns, two for each grouped measurement, and three scales. The numbers on the columns correspond to the numbers in example 6.2 p. 19.

6.4.1

B1 logarethmic timescale in seconds indicating the grouping of arrival intervals.

B2 grouping of measured arrival intervals.
(cf A2)

B3 grouping of calculated arrival intervals. This grouping is calculated as follows:
It is assumed that the observations measured follow a gamma distribution with the shape parameter const and the scale parameter alfa. These are calculated using the mean and the variance. As position parameter is used the minimum value for the values measured.

On the basis of this gamma distribution the average number of observations is calculated within each class.

The following formulae form the basis for the average:

Calculated observations in]X1,X2]=

$$\frac{\alpha^k}{\Gamma(k)*4} * X_4 * N *$$

$$[(X_1-\min)^{(k-1)} * e^{-\alpha(X_1-\min)}$$

$$+(X_2-\min)^{(k-1)} * e^{-\alpha(X_2-\min)}$$

$$+2*(X_3-\min)^{(k-1)} * e^{-\alpha(X_3-\min)}]$$

where
α = scale parameter for the gamma distribution
= the mean/the variance

k = shape parameter for the gamma distribution
= (the mean)^2/the variance

N = number of observations

X_1 = lower class borderline

X_2 = upper class borderline

X_3 = middle of class

X_4 = width of class

$\Gamma(k)$ = the gamma function as calculated after Stirling's asymptotic series, which takes the first three terms into consideration.

For the comparison is used a gamma distribution, which gives the following advantages:

- it only operates with values for the variable >= 0 (likewise the measurements are >= 0)

- CONST ~ 1 gives the exponential distribution (it is expected that some measurements follow the exponential distribution)

- CONST >10 gives an approximated normal distribution with the measured mean and the standard deviation. (it is expected that some of the measurements follow the normal distribution)

Example 6.21 p. 29: In the class]1.78, 2.37] 3 observations have been observed and according to the gamma distribution with const = 0.75, alfa = 0.61, and the position parameter (the minimum value) = 0.39, 11 transactions have been calculated.

When the number of observations in the individual classes are compared, it must be taken into consideration that the widths of the classes differ. This applies to both measured and calculated data. If this is left out of consideration it will result in a distorted distribution.

On p.32 is shown a histogram covering the cpu-times for the example on p. 29.

The x-axis designates the time in seconds and the y-axis designates (the relative number of observations)/class width.

The same system shows the calculated class distribution and a G(0.42,0.78) with the position parameter 0.10 (= the minimum value for the cpu-times). As it appears from the diagram the three curves do not correspond very well. This is a.o. due to the fact that the number of transactions is 99, and that total number of measured transactions differ so much from the number of calculated observations.

B4 logarithmic timescale in seconds for grouping cpu-. processing-, waiting-, and responsetime. The scales B1 and B4 are always identical.

B5 and B6 grouping of measured and calculated cpu-times (see B2 and B3)

B7 and B8 grouping of measured and calculated processing times (see B2 and B3)

B9 and B10 grouping of measured and calculated waiting times (see B2 and B3)

B11 and B12 grouping of measured and calculated response times (see B2 and B3)

B13 scale for grouping algol-, duet-, and datasegment transports

B14 grouping of measured algolsegment transports (re grouping, see A2)

B15 grouping of calculated algolsegment transports. Re calculation, see B3, but please notice that as the scale is linear in this instance, the observation for each class can be compared. The interval]0.0001,0.5] has been used for the calculations in the lower class and the interval]0.5, 1] for the next class.

B16 and B17 grouping of measured and calculated duetsegment transports (see B14 and B15)

B18 and B19 grouping of measured and calculated data segment transports (see B14 and B15)

The examples below demonstrate the use of the table "comparison of distributions" p. 29.

Example 6.22 : Start at 1.33 in the timescale column (B1). Follow this line to column B2, NO.OF TRANS, and column B3, TRANS.CALC. These columns state that 19 transactions have been measured and 22 transactions calculated, to have an arrival interval between 1.00 and 1.33 sec.

Example 6.23 : Start at 0.18 in the second timescale (B4) and follow this line to column

B9, NO. OF TRANS, and column B10, TRANS.CALC, in the WAITTIME column.
A -1 is seen in column B10, indicating that it has not been possible to calculate the number of transactions, as the shape parameter (CONST) is zero.

Example 6.24 : The rest of the columns in the table can be used in a similar manner. It is possible, though, to use the table in a slightly different manner, as it is possible to describe the number of transactions in each class as a function of time, a so called histogram. For a more detailed description see p. 24. A histogram is shown on p. 32 describing the cpu-times.

6.4.2 -Base 6.4.2

The base contains 6 values for each grouped measurement:

1. The total number of observations measured (TOTAL)

2. The total number of calculated observations (TOTAL)

3. The mean (AVERG); for calculation method, see p. 20.

4. The standard deviation (DEV); for calculation method, see p. 20.

5. The shape parameter (CONST) for the gamma distribution; for calculation method, see p. 22.

6. The scale parameter for the gamma distribution (ALFA); for calculation method, see p. 22.

Example 6.25:

Re processing time (p. 29) the following figures are mentioned:

TOTAL	99	104	(1 and 2)
AVERG	1.24		(3)
DEV	1.42		(4)
CONST		0.77	(5)
ALFA		0.62	(6)

DATE 78 09 21 | START 18 16 00 | FINISH 18 18 04 | ELAPSED 124 SEC | NO. OF TRANSACTIONS 99 | FROM 2 TERMINALS

STATISTICS CONCERNING ALL TRANSACTIONS FROM TRANSNO. 1 TO TRANSNO. 99 PRODUCED OFFLINE

<----ARRIVAL---->			<--DUETCOM-->		<--------CPU-TIME-----SERVICE----WAIT-TIME---RESPONSE-->								<-----ALGOL--DUET--DATA>			
TIME SECS	NO.OF TRANS	FREQ. PCT	NO.IN QUEUE	NO.OF OBSV	TIME SECS	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF SEGM	NO.OF TRANS	NO.OF TRANS	NO.OF TRANS
A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18
0.07	1	1.0	0	99	0.07					99	100.0			0	92	53	1
0.10			1		0.10									1	1	1	
0.13			2		0.13	12	12.1							2			14
0.18			3		0.18									3		2	
0.24			4		0.24	16	16.2							4	2	1	19
0.32			5		0.32	18	18.2							5	1	2	27
0.42	10	10.1	6		0.42	35	35.4	11	11.1			11	11.1	6		1	9
0.56	5	5.1	7		0.56	6	6.1	4	4.0			5	5.1	7		3	8
0.75	18	18.2	8		0.75	1	1.0	22	22.2			21	21.2	8		2	6
1.00	32	32.3	9		1.00	1	1.0	29	29.3			29	29.3	9			2
1.33	19	19.2	10		1.33	1	1.0	18	18.2			18	18.2	10		9	1
1.78	2	2.0	11		1.78	3	3.0	3	3.0			3	3.0	11		5	
2.37	3	3.0	12		2.37			3	3.0			4	4.0	12	1		
3.16	2	2.0	13		3.16	3	3.0	2	2.0			1	1.0	13		6	1
4.22	1	1.0	14		4.22	1	1.0	1	1.0			1	1.0	14		1	
5.62	3	3.0	15		5.62	2	2.0	3	3.0			3	3.0	15			2
7.50	2	2.0	16		7.50			2	2.0			2	2.0	16			
10.00	1	1.0	17		10.00			1	1.0			1	1.0	17			
13.34			18		13.34									18		6	
17.78			19		17.78									19			
23.71			20		23.71									20		2	1
31.62			21		31.62									21	1	1	1
42.17			22		42.17									22		1	1
56.23			23		56.23									23			
74.99			24		74.99									24			
100.00			25		100.00									25		1	
133.35			26		133.35									26			
177.83			27		177.83									27			
237.14			28		237.14									28	1		
316.23			29		316.23									29		2	6
TOTAL	99			99		99			99		99		99		99	99	99
MIN.	0.39			0		0.10			0.39		0.00		0.39		0	0	2
MAX.	8.26			0		4.80			8.25		0.00		8.25		28	38	95
AVERG	1.23			0.00		0.55			1.24		0.00		1.24		0.76	5.91	9.41
DEV.	1.42			0.00		0.84			1.42		0.00		1.42		3.74	8.01	15.79
BUSY						54	43.8	123	99.1								

ARRIVAL FROM 2 TERMINALS | 0.8101 TRANS/SEC | 2.4689 SEC/TRANS/TERMINAL | 0.4050 TRANS/SEC/TERMINAL

eks. 6.1

DATE 78 09 21 START 18 16 00 FINISH 18 18 04 ELAPSED 124 SEC NO. OF TRANSACTIONS 99 FROM 2 TERMINALS

STATISTICS CONCERNING ALL TRANSACTIONS FROM TRANSNO. 1 TO TRANSNO. 99 PRODUCED OFFLINE

<----ARRIVAL---->			<--------CPU-TIME-----SERVICE----WAIT-TIME---RESPONSE-->									<---ALGOL-SEGM---DUET-SEGM---DATA-SEGM>					
TIME SECS	NO.OF TRANS	TRANS CALC.	TIME SECS	NO.OF TRANS	TRANS CALC.	NO.OF TRANS	TRANS CALC.	NO.OF TRANS	TRANS CALC.	NO.OF TRANS	TRANS CALC.	NOOF SEGM	NO.OF TRANS	TRANS CALC.	NO.OF TRANS	TRANS CALC.	NO.OF TRANS	TRANS CALC.
B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
0.07	1		0.07					99	-1			0	92	1420	53	147	1	
0.10			0.10						-1			1	1	1	1	9		
0.13			0.13	12	72				-1			2		1		12	14	577
0.18			0.18		10				-1			3		1	2	9		7
0.24			0.24	16	9				-1			4	2		1	7	19	9
0.32			0.32	18	8				-1			5	1		2	5	27	6
0.42	10	8	0.42	35	8	11	7		-1	11	7	6			1	5	9	5
0.56	5	14	0.56	6	8	4	14		-1	5	13	7			3	4	8	4
0.75	18	12	0.75	1	7	22	12		-1	21	12	8			2	3	6	3
1.00	32	12	1.00	1	7	29	13		-1	29	13	9				3	2	3
1.33	19	12	1.33	1	6	18	13		-1	18	12	10			9	2	1	2
1.78	2	12	1.78	3	5	3	12		-1	3	12	11			5	2		2
2.37	5	11	2.37		4	3	11		-1	4	11	12	1			2		2
3.16	2	9	3.16	3	2	2	9		-1	1	9	13			6	2	1	2
4.22	1	6	4.22	1	1	1	6		-1	1	6	14			1	1		2
5.62	3	4	5.62	2	1	3	4		-1	3	4	15				1	2	1
7.50	2	2	7.50			2	2		-1	2	2	16				1		1
10.00	1	1	10.00			1	1		-1	1	1	17				1		1
13.34			13.34						-1			18			6	1		1
17.78			17.78						-1			19				1		1
23.71			23.71						-1			20			2	1	1	1
31.62			31.62						-1			21	1		1	1	1	1
42.17			42.17						-1			22			1	1	1	1
56.23			56.23						-1			23						1
74.99			74.99						-1			24						1
100.00			100.00						-1			25			1			1
133.35			133.35						-1			26						1
177.83			177.83						-1			27						1
237.14			237.14						-1			28	1					1
316.23			316.23						-1			29			2		6	1
TOTAL	99	103		99	148	99	104	99	0	99	102		99	1423	99	221	99	639
AVERG	1.23			0.55		1.24		0.00		1.24			0.76		5.91		9.41	
DEV.	1.42			0.84		1.42		0.00		1.42			3.74		8.01		15.79	
CONST		0.75			0.42		0.77		0.00		0.76			0.04		0.54		0.36
ALFA		0.61			0.78		0.62		0.00		0.62			0.05		0.09		0.04

ekв. 6.2

DATE 78 09 21 START 18 16 00 FINISH 18 18 04 ELAPSED 124 SEC NO. OF TRANSACTIONS 99 FROM 2 TERMINALS

STATISTICS CONCERNING ALL TRANSACTIONS WITH LINECODE IC PRODUCED OFFLINE

<----ARRIVAL---->			<--DUETCOM-->		<--------CPU-TIME-----SERVICE----WAIT-TIME---RESPONSE-->								<-----ALGOL--DUET--DATA>			
TIME SECS	NO.OF TRANS	FREQ. PCT	NO.IN QUEUE	NO.OF OBSV	TIME SECS	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF SEGM	NO.OF TRANS	NO.OF TRANS	NO.OF TRANS
0.07	1	16.7	0	6	0.07					6	100.0			0	5		
0.10			1		0.10									1			
0.13			2		0.13									2			
0.18			3		0.18									3		2	
0.24			4		0.24									4			1
0.32			5		0.32									5			3
0.42			6		0.42	5	83.3							6			
0.56			7		0.56	1	16.7							7			2
0.75			8		0.75									8			
1.00			9		1.00			4	66.7			4	66.7	9			
1.33			10		1.33			1	16.7			1	16.7	10			
1.78			11		1.78			1	16.7			1	16.7	11		3	
2.37			12		2.37									12	1		
3.16			13		3.16									13			
4.22			14		4.22									14			
5.62			15		5.62									15			
7.50			16		7.50									16			
10.00	1	16.7	17		10.00									17			
13.34	1	16.7	18		13.34									18			
17.78			19		17.78									19			
23.71	3	50.0	20		23.71									20			
31.62			21		31.62									21			
42.17			22		42.17									22			
56.23			23		56.23									23			
74.99			24		74.99									24			
100.00			25		100.00									25		1	
133.35			26		133.35									26			
177.83			27		177.83									27			
237.14			28		237.14									28			
316.23			29		316.23									29			
TOTAL	6			6		6		6		6					6	6	6
MIN.	9.11			0		0.33		0.81		0.00		0.81			0	3	4
MAX.	23.45			0		0.43		1.60		0.00		1.60			12	25	7
AVERG	14.30			0.00		0.36		1.03		0.00		1.03			2.00	10.67	5.50
DEV.	8.95			0.00		0.04		0.29		0.00		0.29			4.90	8.04	1.22
BUSY						2	1.8	6	5.0								

ARRIVAL FROM 2 TERMINALS 0.0700 TRANS/SEC 28.5900 SEC/TRANS/TERMINAL 0.0350 TRANS/SEC/TERMINAL

eks. 6.3

TU-MEASUREMENTS GROUPED DISTRIBUTIONS AND FREQUENCY OF OBSERVATIONS PAGE 7

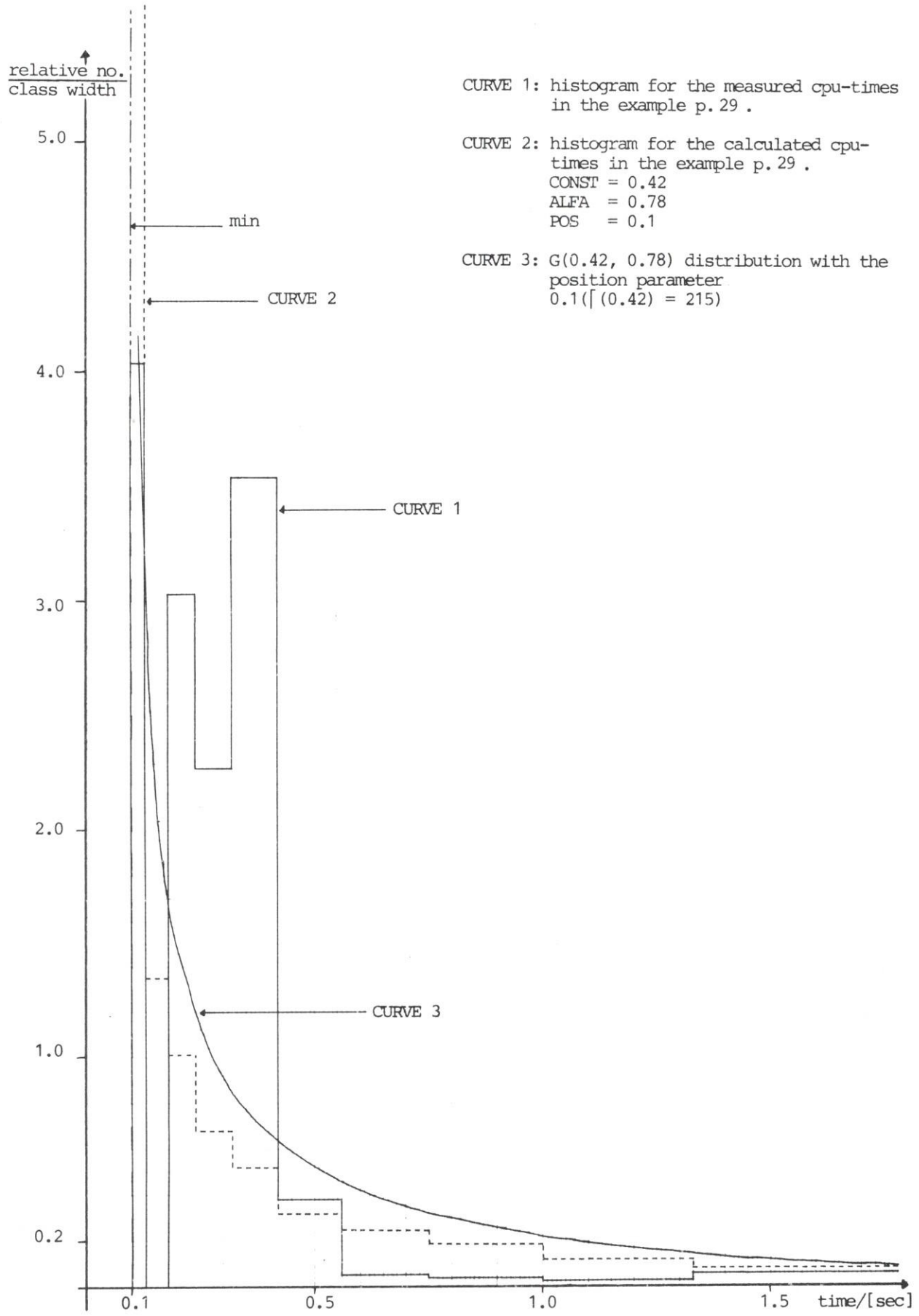
DATE 78 09 21 START 17 45 36 FINISH 18 39 33 ELAPSED 3357 SEC NO. OF TRANSACTIONS 3690 FROM 6 TERMINALS

STATISTICS CONCERNING ALL TRANSACTIONS FROM TERMINALNO. 6 USERNO. 10 PRODUCED OFFLINE

<---ARRIVAL--->			<--DUETCUM-->		<---CPU-TIME--->			<---SERVICE--->		<---WAIT-TIME--->		<---RESPONSE--->		<---ALGOL--DUET--DATA>			
TIME SECS	NO.OF TRANS	FREQ. PCT	NO.IN QUEUE	NO.OF OBSV	TIME SECS	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF TRANS	FREQ. PCT	NO.OF SEGM	NO.OF TRANS	NO.OF TRANS	NO.OF TRANS
0.07	1	0.1	0	1917	0.07					1917	100.0			0	1609	1252	1917
0.10			1		0.10	248	12.9							1	40	66	
0.13			2		0.13	23	1.2							2	52		
0.18			3		0.18	828	43.2							3	33	42	
0.24			4		0.24	74	3.9							4	35	22	
0.32	159	8.3	5		0.32	36	1.9	236	12.3			240	12.5	5	12	12	
0.42	880	46.2	6		0.42	48	2.5	869	45.3			875	45.6	6	13	1	
0.56	92	4.8	7		0.56	80	4.2	54	2.8			47	2.5	7	14	42	
0.75	43	2.2	8		0.75	142	7.4	40	2.1			43	2.2	8	10	37	
1.00	135	7.0	9		1.00	153	8.0	155	8.1			154	8.0	9	9	8	
1.33	215	11.2	10		1.33	162	8.5	210	11.0			215	11.2	10	8	7	
1.78	143	7.5	11		1.78	76	4.0	151	7.9			146	7.6	11	5	33	
2.37	140	7.3	12		2.37	12	0.6	127	6.6			125	6.5	12	3	38	
3.16	29	1.5	13		3.16	8	0.4	28	1.5			25	1.3	13	3	21	
4.22	10	0.5	14		4.22	7	0.4	8	0.4			8	0.4	14	2	7	
5.62	10	0.5	15		5.62	7	0.4	10	0.5			10	0.5	15	3	32	
7.50	9	0.5	16		7.50	11	0.6	7	0.4			7	0.4	16	3	3	
10.00	20	1.0	17		10.00	2	0.1	16	0.8			16	0.8	17	4	4	
13.34	8	0.4	18		13.34			6	0.3			6	0.3	18	2	33	
17.78	5	0.3	19		17.78									19	1		
23.71	2	0.1	20		23.71									20	2	33	
31.62	1	0.1	21		31.62									21	4	6	
42.17	4	0.2	22		42.17									22	2	3	
56.23			23		56.23									23	2	20	
74.99	1	0.1	24		74.99									24	3		
100.00	2	0.1	25		100.00									25	10		
133.35			26		133.35									26	2	23	
177.83			27		177.83									27		3	
237.14	1	0.1	28		237.14									28	2		
316.25	1	0.1	29		316.25									29	29	169	
TOTAL	1917			1917		1917		1917		1917		1917			1917	1917	1917
MIN.	0.25			0		0.09		0.26		0.00		0.26			0	0	0
MAX.	546.08			9		7.76		12.91		0.00		12.91			63	143	0
AVERG	1.53			0.00		0.50		0.90		0.00		0.89			1.65	6.88	0.00
DEV.	14.26			0.00		0.73		1.21		0.00		1.20			6.46	15.53	0.00
BUSY						959	28.6	1730	51.5								

ARRIVAL FROM 1 TERMINALS 0.6556 TRANS/SEC 1.5253 SEC/TRANS/TERMINAL 0.6556 TRANS/SEC/TERMINAL

eks. 6.4



CURVE 1: histogram for the measured cpu-times in the example p. 29 .

CURVE 2: histogram for the calculated cpu-times in the example p. 29 .
CONST = 0.42
ALFA = 0.78
POS = 0.1

CURVE 3: G(0.42, 0.78) distribution with the position parameter
0.1(⌈(0.42) = 215)

9. ERROR MESSAGES 9.

During the execution of the program, three types of error messages may occur:

1. Error in the call of the program (FP-parameter error)

2. User errors, e.g. errors the user is directly responsible for

3. System error, i.e. errors in the systems employed or errors the user is only indirectly responsible for

All error messages have the format shown below

```
***telestatac,<text>
```

Each error is described in more detail in the sections below.

9.1 FP-parameter Errors 9.1

FP-parameter errors may occur either when reading the parameters, or by a value check of them.

9.1.1 Syntax Errors 9.1.1

When reading the FP-parameters, the two messages below may appear:

F001 `***telestatac, error in the fp-parameter: <no> errors found`

F002 `***telestatac, error in params from in.file:<no> errors found`

Where <no> indicates, the number of errors detected.

Each error is denoted in the listing of the parameters by:

<*>: A parameter is missing
<*>: Error in keyword or parameter

9.1.2 The messages shown below may occur by a value check: 9.1.2

V001 | neither transint nor timeint parameter specified

Neither transaction no. interval nor time interval have been specified in the call.

V002 | both the transint and the timeint parameters have been specified

It is not allowed to specify both the transaction no. interval and the time interval; only one specification is allowed.

V003 | start-transactionno greater than end-transactionno.

The specified startnumber is greater than the specified endnumber.

The error messages will be followed by the text:

***telestatac, fp-parameter value error

9.1.3 In addition to the abovementioned error messages, the following two warnings may appear: 9.1.3

W001 | end-transaction no. is greater than 100 000. it will be redefined to 100 000

the end transaction no. is to large and will be redefined to 100.000, in order that the run may continue.

W002

time interval is greater than (24 hour s ÷ start time) end time will be defined as 23.59.59

As the system is not capable of handling a time interval, which includes the change of dates, the endtime will be set to 23.59.59 hours.

9.2 User Errors

User errors comprise the items shown below:

***telestatac, error , phase:<no>, <error text>

where <no> states the phase the program had reached when the error occured.

The error texts shown below may occur:

U002

not sufficient core, lacking halfwords: <no>

SIZE on the jobcard is to small, the number of halfwords lacking is stated in <no>.

U003

not sufficient backing storage, one workfile:<no>

The number of temporary segments specified on the jobcard is not sufficient. A workfile comprises <no> of segments and the program uses up to 3.

U007

to few entries in main catalog, lacking entries: <no>

It has not been possible to create the necessary number of temporary files, as the entries in the main catalog have all been used. <no> states the number of missing entries.

U004

<document> does not contain start transaction or start time

The file indicated (<document>) does not contain the transaction with the specified transactionnumber or start time. If the program has been called with transint. start.<>, the file does not contain records of the statistics type.

U005

<document> has an unacceptable blocklength, probably wrong document specified

The blocklength of the specified file (<document>) not acceptable to the bs-system.

U006

<document> does not exist

The file specified (<document>) does not exist

9.3 System Errors

9.3

System errors have the appearance shown below:

***telestatac, system error, phase: <no>,<error text>

where <no> specifies the phase in which the error occures

The error texts below may occur:

S001

the wanted output disc is not mounted

the program has made an attempt to create a file on "disc", but the disc has not been mounted.

S002

too few resources on the wanted output disc

the program has made an attempt to create a file on "disc"

but sufficient resources were not available (segments or entries)

The following two errors may occur in connection with the bs-system.

S003	<document> contained update mark on closing
S004	<document> contained update mark on opening
W003	terminalno. <no1> greater than 100, the transaction <no2> is skipped

the transaction with the number specified <no2> has been generated from a terminal with a number <no1> greater than 100. The transaction is not included in the analyses.

The program does not stop, but executes only the first part of the program.

If the program cannot create the necessary number of temporary files because of a conflict of names, one of the two following messages will appear.
The last one is a warning.

S005	it was not possible to create a sort area, so the job was stopped
W004	it was not possible to create a sort area, so only the first part of the analysis was executed

In addition to the abovementioned errors and warnings, the warning shown below may occur.

W005	there has been an overflow <no1> times and an under-flow <no2> times, the trans calc. columns on page 2 are not correct.

there has been an instance of overflow or underflow
when calculating observations is a class.
Only the first part of the analysis has been executed.