Critical Path Analysis

Even if critical path analysis does not exactly excite you, this program can be used to find the longest or the shortest route through a large maze. As dimensioned, it will handle a network of up to 50 nodes or junctions, each of which may have up to 5 outlets. The joining links can represent distance or time and the program will list all possible paths, the longest path, or the one with most nodes. Loop back conditions are automatically rejected by the program. Draw your own network on paper and enter the separate link details in the *data lines*. Then press the key, sit back and watch the computer display the path analysis.

```
10 REM * CRITICAL PATH ANALYSIS*
20 REM @ MICHAEL BEWS
30 MODE 1:BORDER 1:INK 0,0:INK 1,24:INK
2,20:INK 3,6:PAPER 0:PEN 1:CLS
40 DIM A$(50),B$(50),P$(30),P(30),T(30)
50 N$=STRING$(30," "):G$=N$
55 sht=99999
60 K=0
70 GOTO 580
80 READ E
90 FOR X=1 TO E
100 READ A,B,C
110 B$(A)=B$(A)+CHR$(33+B):MID$(N$,A,1)=
CHR$(ASC(MID$(N$,A,1))+1)
120 A$(A)=A$(A)+CHR$(33+C)
130  NEXT X
140 READ A:IF A<>-1 THEN PRINT "CHECK SU
M ERROR":STOP
150 LOCATE 19,11 : PRINT"DATA check OK"
160 PEN 2:LOCATE 1,20:PRINT CHR$(18);:LO
CATE 1,20:INPUT"START NODE  ";S:S=INT(S)
:PEN 1:N=S:IF S<1 THEN 160
170 PEN 3:LOCATE 1,21:PRINT CHR$(18);:LO
CATE 1,21:INPUT"FINISH NODE ";F:F=INT(F)
:PEN 1:IF F<1 THEN 170 ELSE MID$(N$,F,1)
=" "
180 IF F>E OR F<1 OR F=S THEN 170
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190 LOCATE 1, 20:PRINT CHR$(20):LOCATE 1
1,20:PRINT"PLEASE WAIT"
200 P=1:H$=N$
210 P$(P)=CHR$(33+N)
220 IF MID$(N$,N,1)=" " THEN 300
230 MID$(G$,N,1)="1"
240 H=ASC(MID$(H$,N,1))-32
250 IF MID$(G$,ASC(MID$(B$(N),H,1))-33,1
)<>" " THEN 540
260 P$(P)=P$(P)+MID$(B$(N),H,1)
270 T(N)=P(P):P(P)=P(P)+ASC(MID$(A$(N),H
,1))-33
280 N=ASC(MID$(B$(N),H,1))-33
290 GOTO 220
300 V=1:G=0
310 FOR X=LEN(P$(P)) TO 1 STEP -1
320 MID$(G$,ASC(MID$(P$(P),X,1))-33,1)="
 "
330 IF G=0 AND MID$(P$(P),X,1)<>CHR$(F+3
3) AND F>0 THEN V=0
340 G=1:IF MID$(H$,ASC(MID$(P$(P),X,1))-
33,1)>"!" THEN 490
350 NEXT X
360 IF V=0 THEN P$(P)=STRING$(32," "):P=
P-1
370 SOUND 1,120,10: LOCATE 1,10:PRINT CH
R$(20):LOCATE 7,10:PEN 3:PRINT"PATH";TAB
(26);"LENGTH":PEN 1:J=0:U=0:R=0:TP=0:FOR
 X=1 TO P:PRINT CHR$(32+32*(X>9)); MID$(
STR$(X),2);"> ";
380 FOR Y=1 TO LEN(P$(X))
390 PRINT MID$(STR$(ASC(MID$(P$(X),Y,1))
-33),2);:IF Y<LEN(P$(X)) THEN PRINT"-";
400 NEXT Y
410 PRINT TAB(27);"=";P(X):IF P(X)>J THE
N J=P(X):K=X
415 IF P(X)<sht THEN sht=P(X):shp=x
420 TP=TP+1:IF Y-1>R THEN R=Y-1:U=X
430 IF X/9 =X\9 THEN LOCATE 5,25:PEN 2:I
NPUT"PRESS ENTER FOR MORE";X$:LOCATE 1,1
1:PRINT CHR$(20):LOCATE 1,11:PEN 1
440 NEXT X
```

```
450 PEN 2:PRINT:PRINT "Number of paths "
;:PEN 1:PRINT CHR$(24);MID$(STR$(S),2);C
HR$(24);:PEN 2:PRINT" to ";:PEN 1:PRINT
CHR$(24);MID$(STR$(F),2);CHR$(24);:PEN 2
:PRINT" =";TP:PEN 1
460 PRINT"Path Number";U;"has most nodes
.(";MID$(STR$(R),2);")"
465 PRINT "Path number";shp;"is shortest
 ("sht")"
470 PEN 3:PRINT"Path Number";K;"is longe
st.(";MID$(STR$(J),2);")":PEN 1
480 LOCATE 13,25:PEN 2:PRINT"<BREAK>":PE
N 1:GOTO 480
490 N=ASC(MID$(P$(P),X,1))-33:MID$(H$,N,
1)=CHR$(ASC(MID$(H$,N,1))-1):Q$=P$(P):P=
P+V:P$(P)=LEFT$(P$(P-V),X):P(P)=T(N)
500 FOR Y=X+1 TO LEN (Q$):Z=ASC(MID$(Q$,
Y,1))-33:IF Z<1 THEN 220
510 MID$(H$,Z,1)=MID$(N$,Z,1)
520 NEXT
530 GOTO 220
540 LOCATE 1,10:PRINT CHR$(20):LOCATE 1,
15:PEN 3: PRINT"Loop-back error":PEN 1:P
RINT:FOR L=1 TO LEN(P$(P)):IF ASC(MID$(P
$(P),L,1))-33<1 THEN 560
550 PRINT ASC(MID$(P$(P),L,1))-33;"-";:N
EXT L
560 PRINT ASC(MID$(B$(N),H,1))-33:PRINT:
PRINT"Please correct Data error."
570 LOCATE 13,25:PEN 2:PRINT"<BREAK>":PE
N 1:GOTO 570
580 REM
590 REM
600 CLS:LOCATE 5,1:PRINT CHR$(24)" CRITI
CAL PATH NETWORK ANALYSIS ":PRINT CHR$(2
4)
610 PEN 2:LOCATE 1,3:PRINT" Critical  Pa
th  Networks can be appliedwherever  sev
eral  inter - dependent     activities ne
ed to be carried out in a  specified seq
uence to achieve a final   goal.":PEN 1
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```
620 PEN 3:LOCATE 1,9:PRINT"The goal migh
t be the completion of a  large project
 or, more simply,arrival ata distant met
ro station by the shortest possible rout
e.":PEN 1
630 LOCATE 1,14:PRINT CHR$(24)" This pro
gram is suitable for both cases":PRINT C
HR$(24)
640 LOCATE 1,16:PEN 2:PRINT"A demonstrat
ion network is shown and theprogram  wil
l  trace  out  all  possiblepaths throug
h the network,indicating thelongest and
shortest routes.":PEN 1
650 PEN 3:LOCATE 15,22:PRINT"PRESS ENTER
":PEN 1
660 X$=INKEY$:IF X$<>CHR$(13) THEN 660 E
LSE CLS
670 WINDOW #1,1,40,1,25:PAPER #1,0:CLS #
1
680 WINDOW #0,5,36,1,25:PAPER #0,0:PEN #
0,1:CLS #0
690 PLOT 70,310:DRAWR 46,64
700 DRAWR 320,0:DRAWR 84,-32
710 PLOT 70,310:DRAWR 96,32:DRAWR 352,0
720 PLOT 70,310:DRAWR 144,0:DRAWR 48,32:
DRAWR 224,0
730 PLOT 70,310:DRAWR 64,-20:DRAWR 160,0
:DRAWR 64,20
740 PLOT 168,342:DRAWR 48,32
750 PLOT 312,376:DRAWR 32,-32:DRAWR 16,-
32:DRAWR 16,-32
760 DRAWR 144,64:REM DRAWR -80,2
770 PLOT 448,312:DRAWR -96,2
780 LOCATE 4,2:PRINT CHR$(24)"4":LOCATE
10,2:PRINT"5":LOCATE 16,2:PRINT"6":LOCAT
E 24,2:PRINT"11":PRINT CHR$(24)
790 LOCATE 1,6:PRINT CHR$(24)"1":LOCATE
7,4:PRINT"2":LOCATE 13,4:PRINT"3":LOCATE
 18,4:PRINT"7":LOCATE 29,4:PRINT"12":PRI
NT CHR$(24)
800 LOCATE 19,6:PRINT CHR$(24)"8":LOCATE
 25,6:PRINT"10":LOCATE 20,8:PRINT "9":PR
INT CHR$(24)
```

```
810 LOCATE 3,3:PEN 2:PRINT "4":LOCATE 8,
2:PRINT"1":LOCATE 14,2:PRINT"1":LOCATE 2
0,2:PRINT"7":LOCATE 27,2:PRINT "3":PEN 1
820 LOCATE 5,4:PEN 2:PRINT "2":LOCATE 11
,4:PRINT "3":LOCATE 16,4:PRINT"5":LOCATE
 23,4:PRINT"11":LOCATE 7,6:PRINT"4":LOCA
TE 22,6:PRINT"3":LOCATE 28,5:PRINT"9":LO
CATE 24,7:PRINT"2":PEN 1
830 LOCATE 9,3:PEN 2:PRINT "3":LOCATE 17
,3:PRINT"2":LOCATE 19,5:PRINT"0":LOCATE
20,7:PRINT"3":LOCATE 12,7:PRINT"11":PEN
1
840 REM
850 LOCATE 2,10:PEN 2:PRINT"Nodes ";:PEN
 1:PRINT CHR$(24);"1";CHR$(24):PRINT"rep
resent the  commencement of  activities,
 (represented by the joining  lines).The
 line lengthsmight represent a number of
 daysor weeks required to complete anact
ivity."
860 LOCATE 1,17:PEN 3:PRINT"Activities c
an progress in one  direction only  and
 the programwill  reject a network havin
g a loop-back condition.":PEN 1
870 LOCATE 1,21:PRINT"Each  activity  pr
ogresses  in  the   direction entered i
n the program DATA."
880 LOCATE 11,24:PEN 2:PRINT"PRESS ENTER
":X$=INKEY$:IF X$<>CHR$(13) THEN 880 ELS
E PEN 1:LOCATE 2,10:PRINT CHR$(20):LOCAT
E 2,13
890 PRINT"The zero (0) length between no
de";CHR$(24);"7";CHR$(24);" and ";CHR$(2
4);"8";CHR$(24);:PRINT" indicates  the
exitence";:PRINT"of a constraint which p
revents":PRINT"activities at node ";CHR$
(24);"8";CHR$(24);" from"
900 PRINT"commencing until ";CHR$(24);"3
";CHR$(24);" to ";CHR$(24);"7";CHR$(24);
" and ";CHR$(24);"6";CHR$(24);" to ";CHR
$(24);"7";CHR$(24);" are complete."
910 LOCATE 11,24:PEN 2:PRINT"PRESS ENTER
":X$=INKEY$:IF X$<>CHR$(13) THEN 910 ELS
E PEN 1:LOCATE 2,10:PRINT CHR$(20):LOCAT
E 2,10
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```
920 GOTO 80
930 REM *** flow chart DATA ****
940 REM * NUMBERS OF CONNECTING LINES*
950 DATA 18
960 REM ** START NODE,FINISH NODE ***
970 DATA 1,4,4
980 DATA 1,2,2
990 DATA 1,3,4
1000 DATA 1,8,11
1010 DATA 2,3,3
1020 DATA 2,5,3
1030 DATA 3,7,5
1040 DATA 4,5,1
1050 DATA 5,6,1
1060 DATA 6,7,2
1070 DATA 6,11,7
1080 DATA 7,8,0
1090 DATA 7,12,11
1100 DATA 8,9,3
1110 DATA 8,10,3
1120 DATA 9,10,2
1130 DATA 10,12,9
1140 DATA 11,12,3
1150 DATA -1
1160 STOP
```