```
                PPPPPPPPPPP   RRRRRRRRRRR    IIIIIIIIII   MM        MM   CCCCCCCCCC   OOOOOOOOOOO  BBBBBBBBBB        11
              PPPPPPPPPPPP  RRRRRRRRRRRR   IIIIIIIIII   MMM      MMM  CCCCCCCCCCCC  OOOOOOOOOOO  BBBBBBBBBBBB      111
             PP        PP  RR        RR       II       MMMM    MMMM  CC         CC  OO        OO  BB        BB     1111
            PP        PP  RR        RR       II       MM MM  MM MM  CC             OO        OO  BB        BB       11
           PP        PP  RR        RR       II       MM  MMMM  MM  CC             OO        OO  BB       BB        11
          PPPPPPPPPPPP  RRRRRRRRRRRR       II       MM   MM   MM  CC             OO        OO  BBBBBBBBBB         11
         PPPPPPPPPPP   RRRRRRRRRRR         II       MM        MM  CC             OO        OO  BBBBBBBBBB         11
        PP            RR    RR            II       MM        MM  CC             OO        OO  BB        BB        11
       PP            RR     RR           II       MM        MM  CC             OO        OO  BB        BB       11
      PP            RR      RR         II       MM        MM  CC         CC  OO        OO  BB        BB       11
     PP            RR       RR    IIIIIIIIII   MM        MM  CCCCCCCCCCCC  OOOOOOOOOOO  BBBBBBBBBBB   1111111111
    PP            RR        RR   IIIIIIIIII   MM        MM   CCCCCCCCCC   OOOOOOOOOOO  BBBBBBBBBB    1111111111


                JJJJJJJJJJ   3333333333         444     777777777777                          AAAAAAAAAA
                JJJJJJJJJJ  333333333333       4444     77777777777                          AAAAAAAAAAAA
                    JJ      33        33      44 44     77      77                            AA        AA
                    JJ                33     44  44          77                               AA        AA
                    JJ                33    44   44         77                                AA        AA
                    JJ              3333    44444444444    77                                AAAAAAAAAAAA
                    JJ              3333   444444444444    77                                AAAAAAAAAAAA
                    JJ                33        44         77                                AA        AA
                JJ  JJ                33        44         77                                AA        AA
                JJ  JJ      33        33        44         77                                AA        AA
                JJJJJJJ     333333333333        44         77                                AA        AA
                 JJJJJ       3333333333         44         77                                AA        AA


****A  START  JOB  347  PRIMCOB1  Eratosthenes Sieve    ROOM        9.58.19 PM 03 NOV 19  PRINTER1  SYS TK4-  JOB  347  START  A****
****A  START  JOB  347  PRIMCOB1  Eratosthenes Sieve    ROOM        9.58.19 PM 03 NOV 19  PRINTER1  SYS TK4-  JOB  347  START  A****
****A  START  JOB  347  PRIMCOB1  Eratosthenes Sieve    ROOM        9.58.19 PM 03 NOV 19  PRINTER1  SYS TK4-  JOB  347  START  A****
```

J E S 2 J O B L O G

```
21.58.19 JOB  347  $HASP373 PRIMCOB1 STARTED - INIT  1 - CLASS A - SYS TK4-
21.58.19 JOB  347  IEF403I PRIMCOB1 - STARTED - TIME=21.58.19
21.58.19 JOB  347  IEFACTRT - Stepname  Procstep  Program   Retcode
21.58.19 JOB  347  PRIMCOB1   PRIMES    COB       IKFCBL00  RC= 0004
21.58.19 JOB  347  PRIMCOB1   PRIMES    GO        LOADER    RC= 0000
21.58.19 JOB  347  IEF404I PRIMCOB1 - ENDED - TIME=21.58.19
21.58.19 JOB  347  $HASP395 PRIMCOB1 ENDED

------ JES2 JOB STATISTICS ------

 03 NOV 19 JOB EXECUTION DATE

       169 CARDS READ

       310 SYSOUT PRINT RECORDS

         0 SYSOUT PUNCH RECORDS

      0.00 MINUTES EXECUTION TIME
```

```
     1     //PRIMCOB1 JOB (COBOL),                                          JOB  347
           //             'Eratosthenes Sieve',
           //             CLASS=A,
           //             MSGCLASS=A,
           //             REGION=8M,TIME=1440,
           //             MSGLEVEL=(1,1),
           //            USER=HERC02,PASSWORD=           GENERATED BY GDL
           ********************************************************************
           ***
           *** Name: SYS2.JCLLIB(PRIMCOB1)
           ***
           *** Desc: Sieve of Eratosthenes programmed in COBOL.
           ***       All prime numbers up to the value entered via
           ***       //GO.SYSIN DD are computed. Due to a COBOL
           ***       implementation limitation a maximum limit
           ***       of 32767 can be entered.
           ***
           ********************************************************************
     2     //PRIMES   EXEC COBUCG,
           //         PARM.COB='FLAGW,LOAD,SUPMAP,SIZE=2048K,BUF=1024K'
     3     XXCOBUCG PROC SOUT='*'                                          00000100
     4     XXCOB EXEC PGM=IKFCBL00,                                        00000200
           XX         PARM='LOAD,SIZE=2048K,BUF=1024K'                     00000300
     5     XXSYSPRINT DD SYSOUT=&SOUT                                      00000400
     6     XXSYSUT1 DD UNIT=SYSDA,SPACE=(460,(700,100))                    00000500
     7     XXSYSUT2 DD UNIT=SYSDA,SPACE=(460,(700,100))                    00000600
     8     XXSYSUT3 DD UNIT=SYSDA,SPACE=(460,(700,100))                    00000700
     9     XXSYSUT4 DD UNIT=SYSDA,SPACE=(460,(700,100))                    00000800
    10     XXSYSLIN DD DSNAME=&LOADSET,DISP=(MOD,PASS),                    00000900
           XX             UNIT=SYSDA,SPACE=(80,(500,100))                  00001000
    11     //COB.SYSPUNCH DD DUMMY
    12     //COB.SYSIN    DD *
    13     //COB.SYSLIB   DD DSNAME=SYS1.COBLIB,DISP=SHR
    14     XXGO EXEC PGM=LOADER,PARM='MAP,LET',COND=(5,LT,COB)             00001100
    15     XXSYSLIN DD DSNAME=*.COB.SYSLIN,DISP=(OLD,DELETE)               00001200
    16     XXSYSLOUT DD SYSOUT=&SOUT                                       00001300
    17     XXSYSLIB DD DSNAME=SYS1.COBLIB,DISP=SHR                         00001400
    18     //GO.SYSOUT   DD SYSOUT=*,DCB=(RECFM=FBA,LRECL=161,BLKSIZE=16100)
    19     //GO.SYSIN    DD *
```

```
  STMT NO. MESSAGE
-
    5     IEF653I SUBSTITUTION JCL - SYSOUT=*
   16     IEF653I SUBSTITUTION JCL - SYSOUT=*
IEF236I ALLOC. FOR PRIMCOB1 COB PRIMES
IEF237I JES2 ALLOCATED TO SYSPRINT
IEF237I 170  ALLOCATED TO SYSUT1
IEF237I 180  ALLOCATED TO SYSUT2
IEF237I 190  ALLOCATED TO SYSUT3
IEF237I 140  ALLOCATED TO SYSUT4
IEF237I 180  ALLOCATED TO SYSLIN
IEF237I DMY  ALLOCATED TO SYSPUNCH
IEF237I JES2 ALLOCATED TO SYSIN
IEF237I 148  ALLOCATED TO SYSLIB
IEF142I PRIMCOB1 COB PRIMES - STEP WAS EXECUTED - COND CODE 0004
IEF285I   JES2.JOB00347.SO0103                       SYSOUT
IEF285I   SYS19307.T215819.RA000.PRIMCOB1.R0000001   DELETED       *--------6
IEF285I   VOL SER NOS= WORK01.
IEF285I   SYS19307.T215819.RA000.PRIMCOB1.R0000002   DELETED       *--------6
IEF285I   VOL SER NOS= WORK02.
IEF285I   SYS19307.T215819.RA000.PRIMCOB1.R0000003   DELETED       *--------9
IEF285I   VOL SER NOS= WORK03.
IEF285I   SYS19307.T215819.RA000.PRIMCOB1.R0000004   DELETED       *--------3
IEF285I   VOL SER NOS= WORK00.
IEF285I   SYS19307.T215819.RA000.PRIMCOB1.LOADSET    PASSED        *-------71
IEF285I   VOL SER NOS= WORK02.
IEF285I   JES2.JOB00347.SI0101                       SYSIN
IEF285I   SYS1.COBLIB                                KEPT          *--------0
IEF285I   VOL SER NOS= MVSRES.
IEF373I STEP /COB     / START 19307.2158
IEF374I STEP /COB     / STOP  19307.2158 CPU    0MIN 00.06SEC SRB    0MIN 00.02SEC VIRT  2076K SYS   220K
*******************************************************************************************************************
*     1. Jobstep of job: PRIMCOB1    Stepname: COB         Program name: IKFCBL00   Executed on 03.11.19 from 21.58.19 to 21.58.19 *
*         elapsed time  00:00:00,17                    CPU-Identifier:  TK4-          Page-in:      0                          *
*             CPU time  00:00:00,08              Virtual Storage used:   2076K        Page-out:      0                          *
*           corr. CPU:  00:00:00,08   CPU time has been corrected by  1 / 1,0  multiplier                                      *
*                                                                                                                             *
*     I/O Operation                                                                                                           *
*     Number of records read via DD * or DD DATA:    141                                                                      *
*     DMY.......0 170.......6 180.......6 190.......9 140.......3 180......71 DMY.......0 DMY.......0 148.......0            *
*                                                                                                                             *
*                                      Charge for step (w/o SYSOUT):          0,13                                        *
*******************************************************************************************************************
IEF236I ALLOC. FOR PRIMCOB1 GO PRIMES
IEF237I 180  ALLOCATED TO SYSLIN
IEF237I JES2 ALLOCATED TO SYSLOUT
IEF237I 148  ALLOCATED TO SYSLIB
IEF237I JES2 ALLOCATED TO SYSOUT
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I PRIMCOB1 GO PRIMES - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS19307.T215819.RA000.PRIMCOB1.LOADSET    DELETED       *-------72
IEF285I   VOL SER NOS= WORK02.
IEF285I   JES2.JOB00347.SO0104                       SYSOUT
IEF285I   SYS1.COBLIB                                KEPT          *-------29
IEF285I   VOL SER NOS= MVSRES.
IEF285I   JES2.JOB00347.SO0105                       SYSOUT
IEF285I   JES2.JOB00347.SI0102                       SYSIN
IEF373I STEP /GO      / START 19307.2158
IEF374I STEP /GO      / STOP  19307.2158 CPU    0MIN 00.02SEC SRB    0MIN 00.00SEC VIRT   332K SYS   212K
*******************************************************************************************************************
```

```
*     2. Jobstep of job: PRIMCOB1    Stepname: GO          Program name: LOADER     Executed on 03.11.19 from 21.58.19 to 21.58.19 *
*         elapsed time  00:00:00,03                    CPU-Identifier:  TK4-           Page-in:      0                          *
*             CPU time  00:00:00,02               Virtual Storage used:    332K        Page-out:      0                          *
*           corr. CPU:  00:00:00,02   CPU time has been corrected by  1 / 1,0  multiplier                                      *
*                                                                                                                               *
*     I/O Operation                                                                                                             *
*     Number of records read via DD * or DD DATA:      1                                                                        *
*     180......72 DMY.......0 148......29 DMY.......0 DMY.......0                                                               *
*                                                                                                                               *
*                                          Charge for step (w/o SYSOUT):          0,03                                      *
*********************************************************************************************************************************
IEF375I  JOB /PRIMCOB1/ START 19307.2158
IEF376I  JOB /PRIMCOB1/ STOP  19307.2158 CPU    0MIN 00.08SEC SRB    0MIN 00.02SEC
```

```
00001      10 * ////////////////////////////////////////////////////         PRIME
00002      20 * // Name: Peter M. Maurer                                      PRIME
00003      30 * // Program: Sieve of Eratosthenes                            PRIME
00004      40 * // Due: Never                                                 PRIME
00005      50 * // Language: COBOL                                           PRIME
00006      60 * //                                                           PRIME
00007      70 * // Changes:                                                  PRIME
00008      80 * // - Juergen Winkelmann, 2014/10/25, o adaption to IBM OS COBOL  PRIME
00009      90 * //                                   o read limit from SYSIN    PRIME
00010     100 * //                                   o n**2 (sqrt) shortcut     PRIME
00011     110 * //                                   o skip even numbers        PRIME
00012     120 * //                                   o compact output format    PRIME
00013     130 * //                                   o 32767 prime flags        PRIME
00014     131 * // - Bill Blasingim,     2019/10/14  3 output alignment fix     WHB
00015     140 * ////////////////////////////////////////////////////         PRIME
00016     150 ***                                                            PRIME
00017     160 ***                                                            PRIME
00018     170 ***                                                            PRIME
00019     180  IDENTIFICATION DIVISION.                                      PRIME
00020     190  PROGRAM-ID.  'PRIMES'.                                        PRIME
00021     200 ***                                                            PRIME
00022     210 ***                                                            PRIME
00023     220 ***                                                            PRIME
00024     230  ENVIRONMENT DIVISION.                                         PRIME
00025     240 **                                                             PRIME
00026     250 **                                                             PRIME
00027     260  CONFIGURATION SECTION.                                        PRIME
00028     270  SOURCE-COMPUTER.  IBM-360.                                    PRIME
00029     280  OBJECT-COMPUTER.  IBM-360.                                    PRIME
00030     290 **                                                             PRIME
00031     300 **                                                             PRIME
00032     310  INPUT-OUTPUT SECTION.                                         PRIME
00033     320  FILE-CONTROL.                                                 PRIME
00034     330      SELECT PRIMES-SYSIN                                       PRIME
00035     340         ASSIGN TO UT-S-SYSIN.                                  PRIME
00036     350 ***                                                            PRIME
00037     360 ***                                                            PRIME
00038     370 ***                                                            PRIME
00039     380  DATA DIVISION.                                                PRIME
00040     390 **                                                             PRIME
00041     400 **                                                             PRIME
00042     410  FILE SECTION.                                                 PRIME
00043     420  FD  PRIMES-SYSIN                                              PRIME
00044     430      RECORDING MODE IS F                                       PRIME
00045     440      RECORD CONTAINS 80 CHARACTERS                             PRIME
00046     450      BLOCK  CONTAINS  1 RECORDS                                PRIME
00047     460      LABEL RECORDS ARE OMITTED                                 PRIME
00048     470      DATA RECORD IS PRIMES-SYSIN-RECORD.                       PRIME
00049     480  01  PRIMES-SYSIN-RECORD.                                      PRIME
00050     490   02 PRIMES-SYSIN-NUMBER PIC 99999999 OCCURS 10.              PRIME
00051     500 **                                                             PRIME
00052     510 **                                                             PRIME
00053     520  WORKING-STORAGE SECTION.                                      PRIME
00054     530      77 I PIC 99999999 COMP VALUE 1.                           PRIME
```

```
00055     540      77 J PIC 99999999 COMP.                                  PRIME
00056     550      77 K PIC 99999999 COMP VALUE 1.                          PRIME
00057     560      77 N PIC 99999999 COMP.                                  PRIME
00058     570      77 N-2 PIC 99999999 COMP.                                PRIME
00059     580      77 SQRTN PIC 99999999 COMP.                              PRIME
00060     590      77 PRODUCT PIC 99999999 COMP.                            PRIME
00061     600      01 BLANK-LINE PIC X(160).                                PRIME
00062     610      01 OUT-INTEGER.                                          PRIME
00063     620       02 SHOWIT PIC ZZZZZZZZ OCCURS 15                        WHB
00064     630      01 OUT REDEFINES OUT-INTEGER.                            PRIME
00065     640       02 OUT-LINE PIC X(120).                                 WHB
00066     650      01 PRIME-FLAGS.                                          PRIME
00067     660       02 ISPRIME PIC 9 OCCURS 32767.                          PRIME
00068     670 ***                                                           PRIME
00069     680 ***                                                           PRIME
00070     690 ***                                                           PRIME
00071     700  PROCEDURE DIVISION.                                         PRIME
00072     710 **                                                           PRIME
00073     720 **                                                           PRIME
00074     730  MAIN-PART.                                                  PRIME
00075     740      OPEN INPUT PRIMES-SYSIN.                                PRIME
00076     750      READ PRIMES-SYSIN AT END DISPLAY '** EOF on SYSIN **'.  PRIME
00077     760      MOVE PRIMES-SYSIN-NUMBER (1) TO N.                      PRIME
00078     770      CLOSE PRIMES-SYSIN.                                     PRIME
00079     780      SUBTRACT 2 FROM N GIVING N-2.                           PRIME
00080     790 *                                                            PRIME
00081     800      PERFORM NEXT-SQUARE UNTIL SQRTN GREATER N.              PRIME
00082     810      MOVE I TO SQRTN.                                        PRIME
00083     820 *                                                            PRIME
00084     830      MOVE 3 TO I.                                            PRIME
00085     840      PERFORM INIT-1 UNTIL I GREATER N.                       PRIME
00086     850 *                                                            PRIME
00087     860      MOVE 3 TO I.                                            PRIME
00088     870      PERFORM CHECK-NUMBER UNTIL I GREATER SQRTN OR EQUAL SQRTN.  PRIME
00089     880 *                                                            PRIME
00090     890      MOVE 3 TO I.                                            PRIME
00091     900      MOVE 2 TO J.                                            PRIME
00092     910      MOVE J TO SHOWIT (K).                                   PRIME
00093     920      PERFORM PRINT UNTIL I GREATER N.                        PRIME
00094     930 *                                                            PRIME
00095     940      MOVE K TO SHOWIT (1).                                   PRIME
00096     950      MOVE N TO SHOWIT (2).                                   PRIME
00097     960      DISPLAY ' '.                                            PRIME
00098     970      DISPLAY SHOWIT (1), ' primes up to ', SHOWIT (2), ' found.'.  PRIME
00099     980      STOP RUN.                                               PRIME
00100     990 **                                                           PRIME
00101    1000 **                                                           PRIME
00102    1010  INIT-1.                                                    PRIME
00103    1020      MOVE 1 TO ISPRIME (I).                                  PRIME
00104    1030      ADD 2 TO I.                                             PRIME
00105    1040 **                                                          PRIME
00106    1050 **                                                          PRIME
00107    1060  CHECK-NUMBER.                                              PRIME
00108    1070      PERFORM ADVANCE UNTIL I GREATER THAN SQRTN OR EQUAL TO SQRT  PRIME
00109    1080 -     N OR ISPRIME (I) EQUAL TO 1.                          PRIME
00110    1090      IF ISPRIME (I) EQUAL TO 1                               PRIME
00111    1100          ADD I I GIVING J                                    PRIME
```

```
00112    1110          MULTIPLY I BY I GIVING PRODUCT                          PRIME
00113    1120          PERFORM CROSS-OUT UNTIL PRODUCT GREATER THAN N.         PRIME
00114    1130      ADD 2 TO I.                                                 PRIME
00115    1140 **                                                               PRIME
00116    1150 **                                                               PRIME
00117    1160  ADVANCE.                                                        PRIME
00118    1170      ADD 2 TO I.                                                 PRIME
00119    1180 **                                                               PRIME
00120    1190 **                                                               PRIME
00121    1200  CROSS-OUT.                                                      PRIME
00122    1210      MOVE 0 TO ISPRIME (PRODUCT).                                PRIME
00123    1220      ADD J TO PRODUCT.                                           PRIME
00124    1230 **                                                               PRIME
00125    1240 **                                                               PRIME
00126    1250  NEXT-SQUARE.                                                    PRIME
00127    1260      ADD 1 TO I.                                                 PRIME
00128    1270      MULTIPLY I BY I GIVING SQRTN.                               PRIME
00129    1280 **                                                               PRIME
00130    1290 **                                                               PRIME
00131    1300  PRINT.                                                          PRIME
00132    1310      IF ISPRIME (I) EQUAL TO 1                                   PRIME
00133    1320          MOVE I TO SHOWIT (J)                                    PRIME
00134    1330          ADD 1 TO K                                              PRIME
00135    1340          ADD 1 TO J                                              PRIME
00136    1350          IF J GREATER 15                                         WHB
00137    1360              DISPLAY OUT-LINE                                    PRIME
00138    1370              MOVE BLANK-LINE TO OUT-LINE                         PRIME
00139    1380              MOVE 1 TO J.                                        PRIME
00140    1390      IF I GREATER N-2 AND J NOT EQUAL 1 DISPLAY OUT-LINE.        PRIME
00141    1400      ADD 2 TO I.                                                 PRIME
```

```
*STATISTICS*     SOURCE RECORDS =   141     DATA DIVISION STATEMENTS =    17     PROCEDURE DIVISION STATEMENTS =    45
*OPTIONS IN EFFECT*     SIZE = 2097152  BUF = 1048576  LINECNT = 57  SPACE1, FLAGW,   SEQ,   SOURCE
*OPTIONS IN EFFECT*     NODMAP, NOPMAP, NOCLIST,   SUPMAP, NOXREF,   LOAD, NODECK, APOST, NOTRUNC, NOLIB, NOVERB
*OPTIONS IN EFFECT*       ZWB
```

5

CARD ERROR MESSAGE

64 IKF1043I-W END OF SENTENCE SHOULD PRECEDE 01 . ASSUMED PRESENT.

VS LOADER

OPTIONS USED - PRINT,MAP,LET,CALL,RES,NOTERM,SIZE=307200,NAME=**GO

NAME	TYPE	ADDR	NAME	TYPE	ADDR	NAME	TYPE	ADDR	NAME	TYPE	ADDR	NAME	TYPE	ADDR
PRIMES	SD	AC010	ILBOSTP0*	SD	B4D18	ILBOSTP1*	LR	B4D2E	ILBODSP0*	SD	B4D50	ILBOBID0*	SD	B5450
ILBOBID2*	LR	B545C	ILBOBID1*	LR	B5470	ILBOIDB0*	SD	B54B8	ILBOIDB1*	LR	B54D4			

TOTAL LENGTH 9510
ENTRY ADDRESS AC010

```
     2     3     5     7    11    13    17    19    23    29    31    37    41    43    47
    53    59    61    67    71    73    79    83    89    97   101   103   107   109   113
   127   131   137   139   149   151   157   163   167   173   179   181   191   193   197
   199   211   223   227   229   233   239   241   251   257   263   269   271   277   281
   283   293   307   311   313   317   331   337   347   349   353   359   367   373   379
   383   389   397   401   409   419   421   431   433   439   443   449   457   461   463
   467   479   487   491   499   503   509   521   523   541   547   557   563   569   571
   577   587   593   599   601   607   613   617   619   631   641   643   647   653   659
   661   673   677   683   691   701   709   719   727   733   739   743   751   757   761
   769   773   787   797   809   811   821   823   827   829   839   853   857   859   863
   877   881   883   887   907   911   919   929   937   941   947   953   967   971   977
   983   991   997  1009  1013  1019  1021  1031  1033  1039  1049  1051  1061  1063  1069
  1087  1091  1093  1097  1103  1109  1117  1123  1129  1151  1153  1163  1171  1181  1187
  1193  1201  1213  1217  1223  1229  1231  1237  1249  1259  1277  1279  1283  1289  1291
  1297  1301  1303  1307  1319  1321  1327  1361  1367  1373  1381  1399  1409  1423  1427
  1429  1433  1439  1447  1451  1453  1459  1471  1481  1483  1487  1489  1493  1499  1511
  1523  1531  1543  1549  1553  1559  1567  1571  1579  1583  1597  1601  1607  1609  1613
  1619  1621  1627  1637  1657  1663  1667  1669  1693  1697  1699  1709  1721  1723  1733
  1741  1747  1753  1759  1777  1783  1787  1789  1801  1811  1823  1831  1847  1861  1867
  1871  1873  1877  1879  1889  1901  1907  1913  1931  1933  1949  1951  1973  1979  1987
  1993  1997  1999

 303 primes up to     2000 found.
```


```
****A   END   JOB  347  PRIMCOB1  Eratosthenes Sieve    ROOM        9.58.19 PM 03 NOV 19  PRINTER1  SYS TK4-  JOB  347   END   A****
****A   END   JOB  347  PRIMCOB1  Eratosthenes Sieve    ROOM        9.58.19 PM 03 NOV 19  PRINTER1  SYS TK4-  JOB  347   END   A****
****A   END   JOB  347  PRIMCOB1  Eratosthenes Sieve    ROOM        9.58.19 PM 03 NOV 19  PRINTER1  SYS TK4-  JOB  347   END   A****
```