

Microprocessor Lab Exam Report

Rwithik Manoj, Roll No: 53

Problem

Identify prime numbers from a given array.

Example: Input: 1,2,3,4,5,6,7,8,9,10 output:1,2,3,5,7

Code

```
; Rwithik Manoj
; Roll No: 53
; TVE17CS054
; Identify prime numbers in an array

DATA SEGMENT
    ARR DB 1,2,3,4,5,6,7,8,9,10
    RESULT DB 20 DUP 0 (?)
    N DB 10
DATA ENDS

CODE SEGMENT
    ASSUME CS:CODE, DS:DATA
    START:
        MOV AX,DATA
        MOV DS,AX
        LEA SI,ARR                ; Move the address of the first element of the array to SI
        LEA DI,RESULT             ; Set DI to the starting address of the result
        MOV CL,N                  ; Set CL to the number of elements, N

        MOV DX,0000H
        MOV AH,00H
    LPO:
        DEC CL                    ; Decrement CL
        MOV AL,[SI]               ; Move the next number to be checked to AL
        MOV BL,02H                ; Set BL to 2
        MOV BH,00H                ; Clear BH. BH store the number of divisors greater than 1
        CMP AL,BL                 ; If the number is less than 2, goto label PRIME
```

```

JLE PRIME

LP1:
    DIV BL                ; Divide AL by BL
    CMP AH,00H            ; Compare the remainder
    JNE NEXT              ; If remainder is not zero, goto lable NEXT
    INC BH                ; Else increment BH
NEXT:
    CMP BH,01H            ; If BH >= 1, then the number is not prime.
    JE NONPRIME
    INC BL                ; Otherwise, increment BL to the next number
    MOV DX,0000H
    MOV AH,00H
    MOV AL,[SI]           ; Reset AL to the original number, AL was overwritten during div
    CMP BL,AL             ; If BL is less than AL, do the inner loop again.
    JNE LP1
PRIME:
    MOV [DI],AL           ; If the number is prime, store it in the results array, and inc
    INC DI
NONPRIME:
    INC SI                ; Increment SI either way
    CMP CL,0
    JNE LPO               ; If CL is greater than zero, do the outer loop again
MOV AH,4CH
INT 21H
CODE ENDS
END START

```

Input 1

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Output 1

1, 2, 3, 5, 7

Input 2

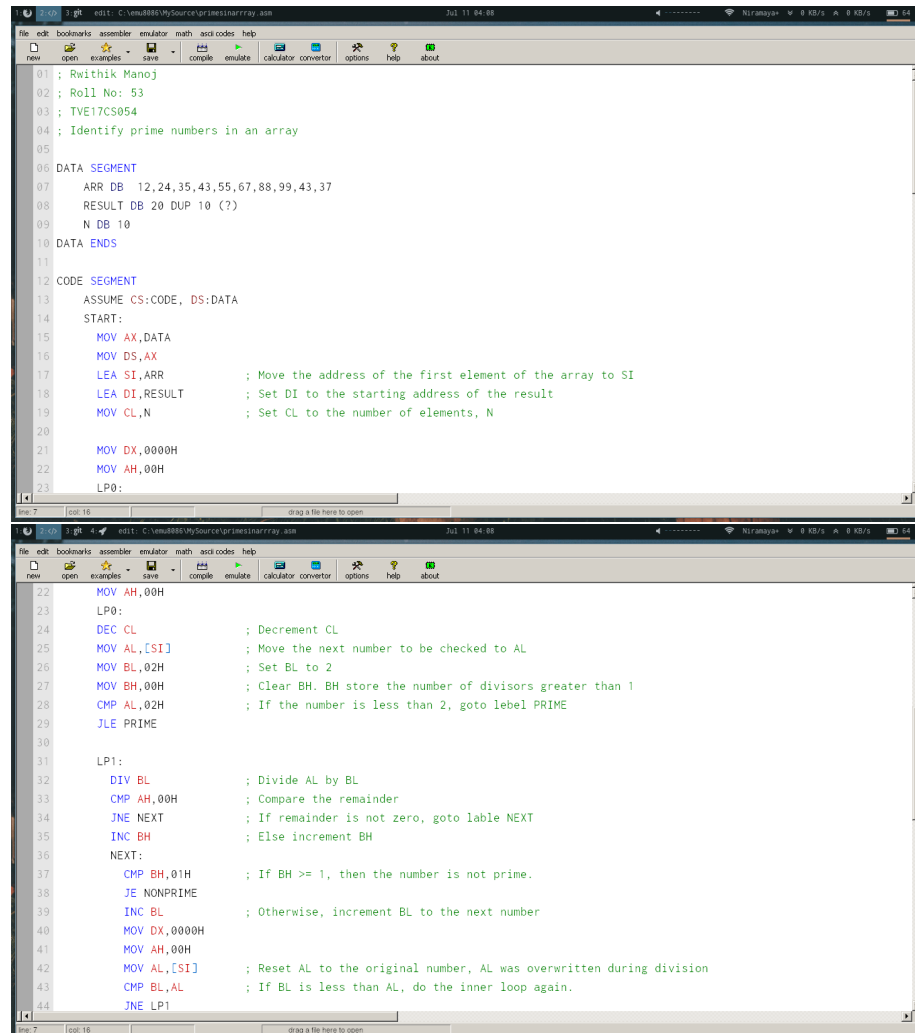
12, 24, 35, 43, 55, 67, 88, 99, 44, 37

Output 2

43, 67, 37

Screenshots

Code



The image displays two screenshots of an x86 assembly code editor, likely a DOS-based IDE like Turbo Assembler. The top screenshot shows the initial setup of the program, including comments, data segment declarations, and the start of the code segment. The bottom screenshot shows the continuation of the code, specifically the logic for checking prime numbers and updating the result array.

```
01 ; Rwithik Manoj
02 ; Roll No: 53
03 ; TVE17CS054
04 ; Identify prime numbers in an array
05
06 DATA SEGMENT
07     ARR DB 12,24,35,43,55,67,88,99,43,37
08     RESULT DB 20 DUP 0 (?)
09     N DB 10
10 DATA ENDS
11
12 CODE SEGMENT
13     ASSUME CS:CODE, DS:DATA
14     START:
15         MOV AX,DATA
16         MOV DS,AX
17         LEA SI,ARR           ; Move the address of the first element of the array to SI
18         LEA DI,RESULT        ; Set DI to the starting address of the result
19         MOV CL,N             ; Set CL to the number of elements, N
20
21         MOV DX,0000H
22         MOV AH,00H
23         LP0:
24
25         MOV AH,00H
26         LP0:
27         DEC CL               ; Decrement CL
28         MOV AL,[SI]          ; Move the next number to be checked to AL
29         MOV BL,02H           ; Set BL to 2
30         MOV BH,00H           ; Clear BH. BH store the number of divisors greater than 1
31         CMP AL,02H           ; If the number is less than 2, goto label PRIME
32         JLE PRIME
33
34         LP1:
35         DIV BL               ; Divide AL by BL
36         CMP AH,00H           ; Compare the remainder
37         JNE NEXT             ; If remainder is not zero, goto label NEXT
38         INC BH               ; Else increment BH
39
40         NEXT:
41         CMP BH,01H           ; If BH >= 1, then the number is not prime.
42         JE NONPRIME
43         INC BL               ; Otherwise, increment BL to the next number
44         MOV DX,0000H
45         MOV AH,00H
46         MOV AL,[SI]          ; Reset AL to the original number, AL was overwritten during division
47         CMP BL,AL             ; If BL is less than AL, do the inner loop again.
48         JNE LP1
49
50         NONPRIME:
51         MOV RESULT[DI],DX
52         INC DI
53         INC SI
54         MOV CL,N
55         MOV AH,00H
56         LP0:
57
58         MOV DX,0000H
59         MOV AH,00H
60         MOV AL,[SI]
61         MOV BL,02H
62         MOV BH,00H
63         CMP AL,02H
64         JLE PRIME
65
66         LP1:
67         DIV BL
68         CMP AH,00H
69         JNE NEXT
70         INC BH
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72         NEXT:
73         CMP BH,01H
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95         CMP AL,02H
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99         DIV BL
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927        CMP AL,02H
928        JLE PRIME
929
930        LP1:
931        DIV BL
932        CMP AH,00H
933        JNE NEXT
934        INC BH
935
936        NEXT:
937        CMP BH,01H
938        JE NONPRIME
939        INC BL
940        MOV DX,0000H
941        MOV AH,00H
942        MOV AL,[SI]
943        CMP BL,AL
944        JNE LP1
945
946        NONPRIME:
947        MOV RESULT[DI],DX
948        INC DI
949        INC SI
950        MOV CL,N
951        MOV AH,00H
952        LP0:
953
954        MOV DX,0000H
955        MOV AH,00H
956        MOV AL,[SI]
957        MOV BL,02H
958        MOV BH,00H
959        CMP AL,02H
960        JLE PRIME
961
962        LP1:
963        DIV BL
964        CMP AH,00H
965        JNE NEXT
966        INC BH
967
968        NEXT:
969        CMP BH,01H
970        JE NONPRIME
971        INC BL
972        MOV DX,0000H
973        MOV AH,00H
974        MOV AL,[SI]
975        CMP BL,AL
976        JNE LP1
977
978        NONPRIME:
979        MOV RESULT[DI],DX
980        INC DI
981        INC SI
982        MOV CL,N
983        MOV AH,00H
984        LP0:
985
986        MOV DX,0000H
987        MOV AH,00H
988        MOV AL,[SI]
989        MOV BL,02H
990        MOV BH,00H
991        CMP AL,02H
992        JLE PRIME
993
994        LP1:
995        DIV BL
996        CMP AH,00H
997        JNE NEXT
998        INC BH
999
1000       NEXT:
1001       CMP BH,01H
1002       JE NONPRIME
1003       INC BL
1004       MOV DX,0000H
1005       MOV AH,00H
1006       MOV AL,[SI]
1007       CMP BL,AL
1008       JNE LP1
1009
1010       NONPRIME:
1011       MOV RESULT[DI],DX
1012       INC DI
1013       INC SI
1014       MOV CL,N
1015       MOV AH,00H
1016       LP0:
1017
1018       MOV DX,0000H
1019       MOV AH,00H
1020       MOV AL,[SI]
1021       MOV BL,02H
1022       MOV BH,00H
1023       CMP AL,02H
1024       JLE PRIME
1025
1026       LP1:
1027       DIV BL
1028       CMP AH,00H
1029       JNE NEXT
1030       INC BH
1031
1032       NEXT:
1033       CMP BH,01H
1034       JE NONPRIME
1035       INC BL
1036       MOV DX,0000H
1037       MOV AH,00H
1038       MOV AL,[SI]
1039       CMP BL,AL
1040       JNE LP1
1041
1042       NONPRIME:
1043       MOV RESULT[DI],DX
1044       INC DI
1045       INC SI
1046       MOV CL,N
1047       MOV AH,00H
1048       LP0:
1049
1050       MOV DX,0000H
1051       MOV AH,00H
1052       MOV AL,[SI]
1053       MOV BL,02H
1054       MOV BH,00H
1055       CMP AL,02H
1056       JLE PRIME
1057
1058       LP1:
1059       DIV BL
1060       CMP AH,00H
1061       JNE NEXT
1062       INC BH
1063
1064       NEXT:
1065       CMP BH,01H
1066       JE NONPRIME
1067       INC BL
1068       MOV DX,0000H
1069       MOV AH,00H
1070       MOV AL,[SI]
1071       CMP BL,AL
1072       JNE LP1
1073
1074       NONPRIME:
1075       MOV RESULT[DI],DX
1076       INC DI
1077       INC SI
1078       MOV CL,N
1079       MOV AH,00H
1080       LP0:
1081
1082       MOV DX,0000H
1083       MOV AH,00H
1084       MOV AL,[SI]
1085       MOV BL,02H
1086       MOV BH,00H
1087       CMP AL,02H
1088       JLE PRIME
1089
1090       LP1:
1091       DIV BL
1092       CMP AH,00H
1093       JNE NEXT
1094       INC BH
1095
1096       NEXT:
1097       CMP BH,01H
1098       JE NONPRIME
1099       INC BL
1100       MOV DX,0000H
1101       MOV AH,00H
1102       MOV AL,[SI]
1103       CMP BL,AL
1104       JNE LP1
1105
1106       NONPRIME:
1107       MOV RESULT[DI],DX
1108       INC DI
1109       INC SI
1110       MOV CL,N
1111       MOV AH,00H
1112       LP0:
1113
1114       MOV DX,0000H
1115       MOV AH,00H
1116       MOV AL,[SI]
1117       MOV BL,02H
1118       MOV BH,00H
1119       CMP AL,02H
1120       JLE PRIME
1121
1122       LP1:
1123       DIV BL
1124       CMP AH,00H
1125       JNE NEXT
1126       INC BH
1127
1128       NEXT:
1129       CMP BH,01H
1130       JE NONPRIME
1131       INC BL
1132       MOV DX,0000H
1133       MOV AH,00H
1134       MOV AL,[SI]
1135       CMP BL,AL
1136       JNE LP1
1137
1138       NONPRIME:
1139       MOV RESULT[DI],DX
1140       INC DI
1141       INC SI
1142       MOV CL,N
1143       MOV AH,00H
1144       LP0:
1145
1146       MOV DX,0000H
1147       MOV AH,00H
1148       MOV AL,[SI]
1149       MOV BL,02H
1150       MOV BH,00H
1151       CMP AL,02H
1152       JLE PRIME
1153
1154       LP1:
1155       DIV BL
1156       CMP AH,00H
1157       JNE NEXT
1158       INC BH
1159
1160       NEXT:
1161       CMP BH,01H
1162       JE NONPRIME
1163       INC BL
1164       MOV DX,0000H
1165       MOV AH,00H
1166       MOV AL,[SI]
1167       CMP BL,AL
1168       JNE LP1
1169
1170       NONPRIME:
1171       MOV RESULT[DI],DX
1172       INC DI
1173       INC SI
1174       MOV CL,N
1175       MOV AH,00H
1176       LP0:
1177
1178       MOV DX,0000H
1179       MOV AH,00H
1180       MOV AL,[SI]
1181       MOV BL,02H
1182       MOV BH,00H
1183       CMP AL,02H
1184       JLE PRIME
1185
1186       LP1:
1187       DIV BL
1188       CMP AH,00H
1189       JNE NEXT
1190       INC BH
1191
1192       NEXT:
1193       CMP BH,01H
1194       JE NONPRIME
1195       INC BL
1196       MOV DX,0000H
1197       MOV AH,00H
1198       MOV AL,[SI]
1199       CMP BL,AL
1200       JNE LP1
1201
1202       NONPRIME:
1203       MOV RESULT[DI],DX
1204       INC DI
1205       INC SI
1206       MOV CL,N
1207       MOV AH,00H
1208       LP0:
1209
1210       MOV DX,0000H
1211       MOV AH,00H
1212       MOV AL,[SI]
1213       MOV BL,02H
1214       MOV BH,00H
1215       CMP AL,02H
1216       JLE PRIME
1217
1218       LP1:
1219       DIV BL
1220       CMP AH,00H
1221       JNE NEXT
1222       INC BH
1223
1224       NEXT:
1225       CMP BH,01H
1226       JE NONPRIME
1227       INC BL
1228       MOV DX,0000H
1229       MOV AH,00H
1230       MOV AL,[SI]
1231       CMP BL,AL
1232       JNE LP1
1233
1234       NONPRIME:
1235       MOV RESULT[DI],DX
1236       INC DI
1237       INC SI
1238       MOV CL,N
1239       MOV AH,00H
1240       LP0:
1241
1242       MOV DX,0000H
1243       MOV AH,00H
1244       MOV AL,[SI]
1245       MOV BL,02H
1246       MOV BH,00H
1247       CMP AL,02H
1248       JLE PRIME
1249
1250       LP1:
1251       DIV BL
1252       CMP AH,00H
1253       JNE NEXT
1254       INC BH
1255
1256       NEXT:
1257       CMP BH,01H
1258       JE NONPRIME
1259       INC BL
1260       MOV DX,0000H
1261       MOV AH,00H
1262       MOV AL,[SI]
1263       CMP BL,AL
1264       JNE LP1
1265
1266       NONPRIME:
1267       MOV RESULT[DI],DX
1268       INC DI
1269       INC SI
1270       MOV CL,N
1271       MOV AH,00H
1272       LP0:
1273
1274       MOV DX,0000H
1275       MOV AH,00H
1276       MOV AL,[SI]
1277       MOV BL,02H
1278       MOV BH,00H
1279       CMP AL,02H
1280       JLE PRIME
1281
1282       LP1:
1283       DIV BL
1284       CMP AH,00H
1285       JNE NEXT
1286       INC BH
1287
1288       NEXT:
1289       CMP BH,01H
1290       JE NONPRIME
1291       INC BL
1292       MOV DX,0000H
1293       MOV AH,00H
1294       MOV AL,[SI]
1295       CMP BL,AL
1296       JNE LP1
1297
1298       NONPRIME:
1299       MOV RESULT[DI],DX
1300       INC DI
1301       INC SI
1302       MOV CL,N
1303       MOV AH,00H
1304       LP0:
1305
1306       MOV DX,0000H
1307       MOV AH,00H
1308       MOV AL,[SI]
1309       MOV BL,02H
1310       MOV BH,00H
1311       CMP AL,02H
1312       JLE PRIME
1313
1314       LP1:
1315       DIV BL
1316       CMP AH,00H
1317       JNE NEXT
1318       INC BH
1319
1320       NEXT:
1321       CMP BH,01H
1322       JE NONPRIME
1323       INC BL
1324       MOV DX,0000H
1325       MOV AH,00H
1326       MOV AL,[SI]
1327       CMP BL,AL
1328       JNE LP1
1329
1330       NONPRIME:
1331       MOV RESULT[DI],DX
1332       INC DI
1333       INC SI
1334       MOV CL,N
1335       MOV AH,00H
1336       LP0:
1337
1338       MOV DX,0000H
1339       MOV AH,00H
```

```

40      MOV DX,0000H
41      MOV AH,00H
42      MOV AL,[SI]      ; Reset AL to the original number, AL was overwritten during division
43      CMP BL,AL        ; If BL is less than AL, do the inner loop again.
44      JNE LP1
45      PRIME:
46      MOV [DI],AL      ; If the number is prime, store it in the results array, and increment DI
47      INC DI
48      NONPRIME:
49      INC SI           ; Increment SI either way
50      CMP CL,0
51      JNE LP0         ; If CL is greater than zero, do the outer loop again
52      MOV AH,4CH
53      INT 21H
54      CODE ENDS
55      END START
56

```

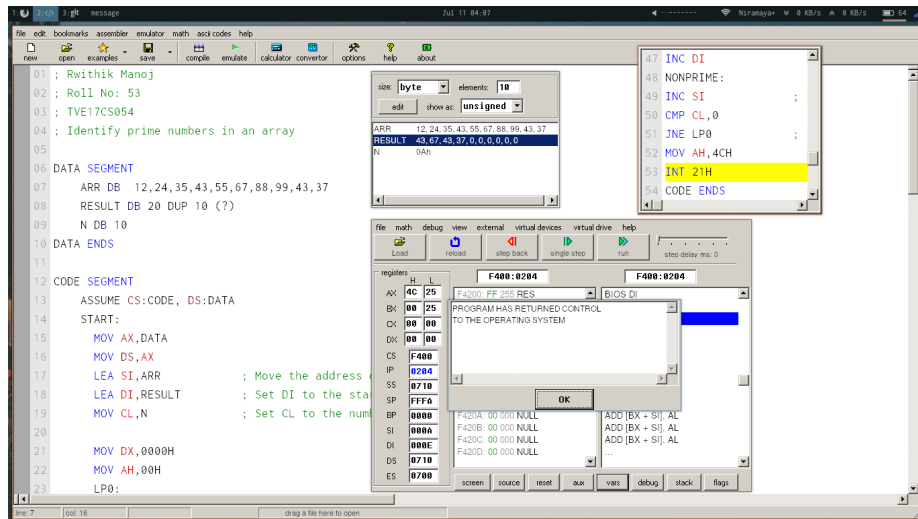
Inputs/Outputs

```

01 ; Rwithik Manoj
02 ; Roll No: 53
03 ; TVE17CS054
04 ; Identify prime numbers in an array
05
06 DATA SEGMENT
07     ARR DB 1,2,3,4,5,6,7,8,9,10
08     RESULT DB 20 DUP 0 (?)
09     N DB 10
10 DATA ENDS
11
12 CODE SEGMENT
13     ASSUME CS:CODE, DS:DATA
14     START:
15         MOV AX,DATA
16         MOV DS,AX
17         LEA SI,ARR      ; Move the address
18         LEA DI,RESULT   ; Set DI to the start of the results array
19         MOV CL,N        ; Set CL to the number of elements in the array
20
21         MOV DX,0000H
22         MOV AH,00H
23         LP0:
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47 INC DI
48 NONPRIME:
49 INC SI
50 CMP CL,0
51 JNE LP0
52 MOV AH,4CH
53 INT 21H
54 CODE ENDS

```

Set 1



Set 2