VauLSMorg

04 ADR-PTR - Addressing & Pointers Aneka Soal Ujian Sistem Operasi A. Wibisono (AW), C. BinKadal (CB) H. Kurniawan (HK)

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1. **2016-2**

```
001 /* (c) 2016 Rahmat M. Samik-Ibrahim -- This is free software
005 * Assume (&ptrchr is 0x7FFFEEDDCCBB, order of bytes: little-endian) */
009 #define LINES 3
010 #include <stdio.h>
012 void printeq(int lines) {
       while (lines-- > 0 ) printf("= = ");
014
       printf("\n");
015 }
017 void main(void) {
018
       int
                       ii;
019
       unsigned char
                       dummy = 'a';
020
       unsigned char* ptrchr = &dummy;
       printeq(LINES);
022
023
       printf(" dummy: %c\n", dummy);
       printf("*ptrchr: %c\n", *ptrchr);
024
025
      printeq(LINES);
026
      printf("%p\n", &ptrchr);
      printeq(LINES);
027
028
      ptrchr = (char*) &ptrchr;
029
       for (ii=0; ii<6; ii++) {
          printf("%X ", *ptrchr);
030
031
          ptrchr++;
032
033
       putchar('\n');
034
       printeq(LINES);
035 }
```

(a) Write down the output of this program

2. **2017-1**

```
C Programing
001 /*
                                                  011 void main(void) {
                                                         char chrvar = 'M';
002 * (c) 2017 Rahmat M. Samik-Ibrahim
                                                  012
                                                  013
          -- This is free software
                                                         int intvar = 0x41424344;
                                                         int* intptr = (int*) chrary;
003 * REV00 Thu Mar 30 18:27:30 WIB 2017
                                                  014
004 * START Thu Mar 30 18:27:30 WIB 2017
                                                  015
                                                         printf("YY. chrary=%p\n", chrary);
                                                                      intptr=%p\n", intptr);
005 * INT is 32 bit little endian
                                                  016
                                                         printf("ZZ.
                                                                        chrvar=%c\n", chrvar);
006 * 41H='A'; 42H='B'; 43H='C"; 44H='D'
                                                  017
                                                         printf("01.
007 */
                                                  018
                                                         printf("02. *chrary=%c\n", *chrary);
800
                                                  019
                                                         printf("03. str chrary=%s\n", chrary);
                                                  020
                                                                  = intvar;
009 #include <stdio.h>
                                                         *intptr
010 char chrary[]="ZZZZ ZZZZ ";
                                                  021
                                                         printf("04. str chrary=%s\n", chrary);
                                                  022 }
Program Output (Line: 015, 016, 017, 018, 019, 021):
YY. chrary=0x600a08
```

3. **2017-2**

```
C Programing ADDR
001 /*
                                                 014 void main (void) {
002 * (c) 2017 Rahmat M. Samik-Ibrahim
                                                 015
                                                         stringPTR=stringChar;
003 * http://rahmatm.samik-ibrahim.vlsm.org/
                                                 016
                                                         printf ("ADDR1: %p VAL: %p STR: %s\n", &stringChar,
                                                                                    stringChar, stringChar);
004 * This is free software.
005 * REV00 Mon Oct 16 21:15:03 WIB 2017
                                                         printf ("ADDR2: %p VAL: %p STR: %s\n", &stringPTR,
006 * START Mon Oct 16 21:15:03 WIB 2017
                                                                                     stringPTR, stringPTR);
                                                 018
                                                         while (*(++stringPTR) != 0) {
007 */
008
                                                              printf ("ADDR3: %p VAL: %p STR: %s\n", &stringPTR
                                                 019
009 #include <stdio.h>
                                                                                          stringPTR, stringPTR);
010
                                                 020
011 char* stringChar="HALLO";
                                                 021
                                                         printf ("End of String = %p\n", stringPTR);
012 char* stringPTR;
                                                 022 }
Program Output:
ADDR1: 0x601038 VAL: 0x400674 STR: HALLO
       0x601048 VAL: 0x400674 STR: HALLO
```

4. 2018-1

What is the output of this following program:

```
001 /* (c) 2018 This is a free program
                                         */
                                               018 /* Clue#1: All strings end with 0x00 */
002 /* Rahmat M. Samik-Ibrahim
                                         */
                                               019 /* Clue#2: Address=64 bit BIG ENDIAN */
003 /* The "array" starts at 0x601040 */
                                               020 /* Clue#3: ASCII '0' (Zero) is 0x30 */
004 /* The "pointer" address is 0x601050 */
                                               021 /* Clue#4: ASCII 'A'
                                                                               is 0x41 */
005
006 #include <stdio.h>
007
008 char array[]="0123456789ABCDE";
009 char* pointer=array;
010 void main(void) {
011
      printf("START\n");
012
      printf("%p\n", &pointer);
013
      printf("%p\n", pointer);
      printf("%s\n", pointer);
014
015
      printf("%d\n", pointer[15]);
016
      printf("STOP\n");
017 }
```

Initially, addresses 0x601040 - 0x60105F = 0x00. What will be in those addresses after executing the program?

Addresses (HEX)	0	1	2	3	4	5	6	7	8	9	A	В	С	D	Е	F
0000 0000 0060 1040																
0000 0000 0060 1050																

5. **2018-2** (44%)

What is the output of this following program:

```
001 /* (c) 2018 This is a free program
                                          */
                                                     019 /* This Clue #1 - Clue #5
                                                                                             */
002 /* Rahmat M. Samik-Ibrahim
                                                     020
                                          */
003
                                                     021 /* 1: All strings end with 0x00
004 #include <stdio.h>
                                                     022 /* 2: Address=64 bit Little ENDIAN */
005
                                                     023 /* 3: ASCII '0' (Zero)
                                                                                 is 0x30
                                                                                             */
006 unsigned char string[]="0123456789ABCDE";
                                                     024 /* 4: ASCII 'A'
                                                                                             */
007 unsigned long longst=(unsigned long) string;
                                                     025 /* 5: Long Integer Size = 64bit
                                                                                             */
008 unsigned char* achar;
                                                     026
009
010 void main(void) {
                                                    PROGRAM OUTPUT
011
       achar=(unsigned char*) &longst;
       printf("(0) %p\n", string);
012
                                                     (0) 0x601040
013
      printf("(1) %p\n", &longst);
                                                     (1) 0x601050
      printf("(2) %p\n", &achar);
014
                                                     (2) 0x601060
015
      printf("(3) \%p\n",
                            achar);
                                                     (3) 0x601050
      printf("(4) %#X\n", *achar);
016
                                                     (4) 0X40
                                                     (5) 0x000000000601040
017
      printf("(5) %#16.16lx\n",longst);
018 }
```

Initially, addresses 0x601040 - 0x60106F = 0x00. What will be in those addresses after executing the program?

Addresses (HEX)	0	1	2	3	4	5	6	7	8	9	A	В	С	D	Ε	F
0000 0000 0060 1040																
0000 0000 0060 1050																
0000 0000 0060 1060																

6. **2019-1** (53.9%)

```
Clue #1 - Clue #5:
                                          001 // (c) 2019 This is Free Software
                                          002 // Rahmat M. Samik-Ibrahim 20190315-1352 R01
1: All strings end with 0x00.
2: Address=64 bit Little ENDIAN.
                                          003
3: ASCII 'A' is 0x41.
                                          004 #include <stdio.h>
4: ASCII 'a' is 0x61.
                                          005 char ch_array[]="abcdefg";
                                          006 char* ch_pointer="ABCDEFG";
5: Initially Addresses:
   0x0000 5566 7788 9900 - 991F = 0x00.
                                          007
Program Output:
                                          008 void main(void) {
 &ch_array[0]=0x556677889910
                                          009
                                                 printf(" &ch_array[0]=%p\n", &ch_array[0]);
  ch_array[0]=a
                                                 printf(" ch_array[0]=%c\n", ch_array[0]);
                                          010
                                                 ch_pointer = ch_pointer + 5;
                                          011
                                                 printf(" &ch_pointer =%p\n", &ch_pointer);
 &ch_pointer =0x556677889918
                                          012
                                                 printf(" ch_pointer =%p\n", ch_pointer);
  ch_pointer =0x556677889909
                                          013
                                                 printf(" *ch_pointer =%c\n", *ch_pointer);
 *ch_pointer =F
                                          014
                                          015 }
```

What will be in these following addresses after executing the program (in **hexadecimal**)?

Addresses (HEX)	0	1	2	3	4	5	6	7	8	9	A	В	С	D	Ε	F
0000 5566 7788 990X																
0000 5566 7788 991X																

7. 2019-2 (45%)

```
001 // (c) 2019 This is Free Software
                                         018 #include <stdio.h>
002 // Rahmat M. Samik-Ibrahim 20191021
                                         019 #include <string.h>
003 /*
                                         020 char string1[]="0123456";
004 These are Clue #1 - Clue #5:
                                         021 char string2[]="0123456";
005 ==========
                                         022 char* stringPtr;
                                         023
006 1:All strings end with 0x00.
007 2:A "string size" includes that 0x00.
                                         024 void main(void) {
                                         025
                                                      size1=sizeof(string1);
008 3:All arrays start with index 0.
009 4:Address=64 bit Little ENDIAN.
                                         026
                                                stringPtr=&string1[size1-1];
                                                printf("1. &string1[0]=%p\n", &string1[0]);
010 5:ASCII '0' is 0x30.
                                         027
                                                printf("2. &string2[0]=\printf("2. \&string2[0]);
                                         028
011 The program output (lines 27-29):
                                                printf("3. &stringPtr =%p\n", &stringPtr);
012 =============
                                         029
                                                printf("4. stringPtr =%p\n", stringPtr);
013 1. &string1[0]=0x556677889910
                                         030
014 2. &string2[0]=0x556677889918
                                         031
                                                *stringPtr = '7';
                                         032
                                                printf("5. STRING:
                                                                      %s\n", &string1[0]);
015 3. &stringPtr =0x556677889928
                                         033 }
016 */
```

- (a) Program Output (line 30) (46%): ______
- (b) Program Output (line 32) (31%): ______
- (c) What will be in these following addresses after executing the program (in **hexadecimal**) (49%)?

Addresses (HEX)	0	1	2	3	4	5	6	7	8	9	A	В	С	D	Е	F
0000 5566 7788 991X																
0000 5566 7788 992X																

8. **2020-1**

```
019 #include <stdio.h>
001 // (c) 2020 This is Free Software
002 // Rahmat M. Samik-Ibrahim 2020
                                         020 #include <string.h>
003 // R03 0310Tue1715
                                         021 typedef unsigned long UL;
                                         022 char* stringptr="0123456";
004 /*
005 This Clue #1 - Clue #5:
                                         023 char string1[]="89ABCDE";
                                         024
006 ==========
007 1: All strings end with 0x00.
                                         025 void main(void) {
                                         026
                                                 printf("1. %#16.16lX\n", (UL) stringptr);
008 2: All arrays start with index 0.
                                                 printf("2. %#16.16lX\n", (UL) &stringptr);
009 3: Address=64 bit Little ENDIAN.
                                         027
010 4: ASCII '0' is 0x30.
                                         028
                                                 printf("3. %#16.16lX\n", (UL) &string1[0]);
011 5: ASCII 'A' is 0x41.
                                         029
                                         030
                                                 printf("4. %#16.16lX\n", (UL) &string1[6]);
012 The first 3 lines of program output:
013 =============
                                                 printf("5. %#X %c\n",string1[6], string1[6]);
                                         031
                                                 printf("6. %#X %c\n",*stringptr, *stringptr);
014 1. 0X0000556677665520
                                         032
015 2. 0X0000556677889918
                                         033
                                                 stringptr++;
                                                 printf("7. %#16.16lX\n", (UL) stringptr);
016 3. 0X0000556677889910
                                         034
                                                 printf("8. %#X %c\n",*stringptr, *stringptr);
                                         035
017 */
                                         036 }
```

D	\cap	
Program	Onto	11:

1	ر ه	(line 30))	
(a)	(mie 50	/	

- (b) (line 31) ______
- (c) (line 32) ______
- (d) (line 34) ______
- (e) (line 35) ______
- (f) **INITIALLY**, addresses 0x556677665520 0x55667766552F, and 0x556677889910 0x55667788991F = 0; What will be in those addresses after executing the program (in**hexadecimal**)?

Addresses (HEX)	0	1	2	3	4	5	6	7	8	9	A	В	С	D	Е	F
0000 5566 7766 552X																
0000 5566 7788 991X																

9. 2022-2 (47.3%)

Program "mymemory3.c" a shortened version of the "mymemory2.c" program in the last **WEEK 05** assignment. See next page for output program "mymemory3" and source code "mymemory3.c" (Line numbers are added).

(a) (45%) Based on the output of the "mymemory3" program, what is the "Total usable main memory size" of that system? Answer:

Total Memory:	М	F	ł

```
guestInfo.bufferram/1024/1024);
                                                                                                                                                                                                                                                                                         guestInfo.totalswap/1024/1024);
                                                                                                                                                                                                                                                                                                                                                                                                                                               guestInfo.freeswap/1024/1024);
                                                                                                                                                                                                                                                                                                            guestInfo.freeswap/1024/1024);
                                                                                                                                                                                                                                                                                                                                                                           guestInfo.freeswap/1024/1024);
                                                                                                                                                                                                                                       guestInfo.totalram/1024/1024)
                                                                                                                                                                                                                                                                                                                                                          guestInfo.freeram/1024/1024);
                                                                                                                                                                                                                                                                                                                                                                                                                             guestInfo.freeram/1024/1024);
                                                                                                                                                                                                                                                         guestInfo.freeram/1024/1024)
                    Ψ
                                                                                                                                                                                                                                                                                                                            IntPtr intArray=malloc((ArraySize+1) * sizeof(int));
                    018 void printMyAddress (AnyAddrPtr address, String message)
                                                                                                                                                                                                                                                                                                                                                                                             for (int ii=0; ii<ArraySize; ii++) intArray[ii]=255;
                                                                                                                                                                                                                                                                                                                                                                                                                                                              "printMyAddress()");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 "&localdummy");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  '&guestInfo");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 "&pcounter");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  "&intArray");
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                "intArray")
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 "printf()")
                                                    pcounter++, (UL) address, message);
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                "main()");
                                    printf("ZCZC ADDR %2.2d %#16.161X %s\n"
                                                                                                                                                                                                                                                                                                                                                           %51u MB\n",
                                                                                                                                                                                                                                                                                                                                                                                                                             %51u MB\n",
                                                                                                                                                                                                                                                                                                                                                                           printf("ZCZC FREESW1 %5lu MB\n",
                                                                                                                                                                                                                                                                                                                                                                                                                                              printf("ZCZC FREESW2 %51u MB\n",
                                                                                                                                                                                                                                        %51u MB\n",
                                                                                                                                                                                                                                                          %51u MB\n",
                                                                                                                                                                                                                                                                          %51u MB\n",
                                                                                                                                                                                                                                                                                         %51u MB\n",
                                                                                                                                                                                                                                                                                                           %51u MB\n",
                                                                                                                                                                                                                                                                                                                                                                                                                                                               printMyAddress( printMyAddress,
                                                                                                                       128*1024*1024
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 printMyAddress(&localdummy,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   printMyAddress(&guestInfo,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                printMyAddress( intArray,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  printMyAddress(&intArray,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 printMyAddress(&pcounter,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  printMyAddress( printf,
                                                                                                                                                                        localdummy=0;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                printMyAddress (main,
                                                                                                                                                                                                                                                                                                                                           sysinfo(&guestInfo);
                                                                                                                                                                                                                                                                                                                                                                                                               sysinfo(&guestInfo);
                                                                                                                                                                                                                          sysinfo(&guestInfo);
                                                                                                                                                                                                                                                                                                            printf("ZCZC FREESW
                                                                                                                                                                                                                                                                           BUFFER
                                                                                                                                                                                                                                                                                                                                                                                                                              printf("ZCZC FREE2
                                                                                                                                                                                                                                                                                                                                                            printf("ZCZC FREE1
                                                                                                                                                       SYSINFO guestInfo;
                                                                                                                                                                                                                                                                                          printf("ZCZC SWAP
                                                                                                                                                                                                                                                         printf("ZCZC FREE
                                                                                                                                                                                                                                         printf("ZCZC RAM
                                                                                                                       023 #define ArraySize
                                                                                                                                                                                                                                                                           printf("ZCZC
    017 int pcounter=1;
                                                                                                                                      024 int main(void)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   sleep(1);
                                                                                                                                                                         int
                                                                      ~
                                                                     021
                                    019
                                                    020
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                                                                                                                                                                                                                                                                        031
##############
                                                                                                                                                                                                                                                                                                                                         mymemory3.c ###################################
                                                                                                                                                                                    0X000055E3A0079155 printMyAddress()
                                                                                                                                                                                                                                                                                    ZCZC ADDR 07 0X00007FFFCEC2F26C &localdummy
                                                                                                                                                                                                                                                                                                      OX00007FFFCEC2F270 &guestInfo
                                                                                                                                                                                                                                                                      OX00007FFFCEC2F260 &intArray
                                                                                                                                                                                                                     0X000055E3A007C040 &pcounter
                                                                                                                                                                                                                                                                                                                                                                                        002 // This program is free script/software.
                                                                                                                                                                                                                                    ADDR 04 0X00007FCC6D324010 intArray
                                                                                                                                                                                                                                                     OX00007FCC8D378CF0 printf()
                                                                                                                                                                                                    0X000055E3A0079192 main()
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              AnyAddrPtr;
                                                                                                                                                                                                                                                                                                                                                                         Copyright (C) 2022 C. BinKadal
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               SYSINFO;
                                                                                                                                                                                                                                                                                                                                                                                                        003 // REV01: Tue 11 Oct 2022 19:00
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            String;
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            IntPtr;
                                                                                                                                                                                                                                                                                                                                                                                                                          START: Tue 11 Oct 2022 18:00
#### OUTPUT + LINES of mymemory3
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           009 #include <sys/sysinfo.h>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               typedef struct sysinfo
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              013 typedef unsigned long
                                               26 MB
1 MB
975 MB
                                                                                                940 MB
                                                                                                                 26 MB
                                                                                                                                 940 MB
                                                                                                                                                   7 MB
                                                                                                                                                                  442 MB
                                                                                                                                                                                                                                                                                                                                                                                                                                                                            #include <stdlib.h>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           008 #include <unistd.h>
                                                                                                                                                                                                                                                                                                                                                                                                                                                          006 #include <stdio.h>
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             011 typedef char*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              014 typedef void*
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             typedef int*
                                                                                                                                                                                                                   ADDR 03
                                                                                                                                                                                                                                                                    ADDR 06
                                                                                                                                                                                                                                                    ADDR 05
                                                                                                                                                                                                                                                                                                      ADDR 08
                                                                                                                                                                                                    ADDR 02
                                                                                                                                                                                    ADDR 01
                                                                                                                                                                   FREESW2
                                                                                                                                  FREESW1
                                                                                                 FREESW
                                                                 BUFFER
                                                                                                                                                   FREE2
                                                                                                                  FREE1
                                                                                 SWAP
                                                                                                                                                                                    ZCZC
                                                                                                                                                                                                                                      ZCZC
                                                                 ZCZC
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07
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10
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14
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                                01
                                                                                                                                                                                                                  12
```

(b)	(70%) Based on the output of the "mymemory3" program, what is the "Total swap space size" of that system? What was initially the "free swap space still available size"? Answer:
	Total Swap Size: MB.
	Free Available Size: MB.
(c)	(31%) What is the name of the Linux system call that returns specific statistics on memory and swap usage above?
	System Call Name:
(d)	(36%) Function malloc() is a C library routine that allocates memory dynamically. What happens to the memory when the malloc() function is called in line 34 of the program? What happens to the memory when the allocated memory is used in line 38? Explain and show any lines in the program or output lines of the program that support your explanation!
	Explain lines 34 and 38 (Max. 4 lines!):
(e)	(77%) Variable "pcounter" is a 32-bit LITTLE ENDIAN variable. Is "pcounter" a local or global variable?
	Variable "pcounter":
(f)	(38%) What is the value of variable "pcounter" just before the program exits?
	Value of "pcounter":
(g)	(77%) What is the Virtual Address of "pcounter" (in hexadecimal)?
	Virtual Address of "pcounter": (HEX)
(h)	(30%) Write down the value of "pcounter" into the virtual address of "pcounter" (in hexadecimal)!
	Virtual Addresses (HEX) 0 1 2 3 4 5 6 7 8 9 A B C D E F

10. **2023-2** (CB:46%)

```
01 // Copyright (C) 2023 BinKadal, Sdn. Bhd.
                                            29 char
                                                       array[]="0123456789ABCDE";
02 // This program is free script/software.
                                            30
                                                STRING
                                                         dummy="ZZZZZZZZZZ";
03 // This program is distributed in the
                                                STRING string="abcdefghijklmno";
                                            31
04 // hope that it will be useful, but
                                            32
05 // WITHOUT ANY WARRANTY; without even
                                            33 void main(void) {
06 // implied warranty of MERCHANTABILITY
                                            34
                                                    printf("X1. %#16.161X\n", (UL) dummy);
07 /* or FITNESS FOR A PARTICULAR PURPOSE.
                                            35
                                                    printf("X2. %#16.16lX\n", (UL) string);
08 # INFO: UTS 2023-2 (midterm) */
                                                    printf("\n");
                                            36
09 // REV01: Mon 09 Oct 2023 19:00
                                            37
                                                    printf("X3. %#16.161X\n", (UL) &array[0]);
11 // START: Mon 09 Oct 2023 17:00
                                                    printf("X4. %#16.161X\n", (UL) &dummy);
                                            38
12
                                            39
                                                    printf("X5. %#16.161X\n", (UL) &string);
13 /* This Clue #1 - Clue #6:
                                            40
                                                    printf("\n");
   ================
                                                    printf("01. %s\n",
                                                                                   string);
                                            41
   1: All strings end with 0x00.
                                            42
                                                    printf("02. %c\n",
                                                                                  *string);
   2: All arrays start with index 0.
                                            43
                                                    string+=2;
   3: Address=64 bit Little ENDIAN.
                                                    printf("03. %#16.16lX\n", (UL) string);
                                            44
20 4: ASCII '0' is 0x30.
                                                    printf("04. %c\n",
                                            45
                                                                                   *string);
21
   5: ASCII 'A' is 0x41.
                                                    printf("\n");
                                            46
  6: ASCII 'a' is 0x61.
                                                    printf("05. %s\n",
22
                                            47
                                                                                   array);
23
   */
                                            48
                                                    string=&array[2];
                                                    printf("06. %c\n",
24
                                            49
                                                                                  *string);
25 #include <stdio.h>
                                            50
                                                    printf("07. %#16.16lX\n", (UL) string);
26 #include <string.h>
                                            51
                                                    string+=2;
27 typedef unsigned long UL;
                                                    printf("08. %c\n",
                                                                                   *string);
                                            52
28 typedef char* STRING;
                                            53
                                                    printf("09. %#16.16lX\n", (UL) string);
                                            54 }
```

Program Output:

Aneka Soal Ujian Sistem Operasi	04 ADR-PTR	Halaman 9 dari 9
(f) (55% line 49)		
(g) (55% line 50)		
(h) (55% line 52)		

(i) (55% line 53) ______

(j) INITIALLY , addresses 0x5566 7788 B010 -	0x5566 7788 B02F	= FF; What wil	l be in those addresses
after executing the program (in hexadecima	.) (24%) ?		

Addresses (HEX)	0	1	2	3	4	5	6	7	8	9	A	В	С	D	\mathbf{E}	F
0000 5566 7788 B010																
0000 5566 7788 B020																