VauLSMorg

10 IONet - I/O & Network Programing
Aneka Soal Ujian Sistem Operasi

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1. **2016-1a**

   Circle or cross: "**T**" if True – "**F**" if False.

   T / F A bus is a CPU system that transfers data between components inside a computer, or between computers (WIKI).

   T / F Port-mapped I/O uses the same address bus to address both memory and I/O devices (WIKI).

   T / F The kernel I/O subsystem is the largest part of a kernel system (Silber9).

   T / F Performance can be improved by utilizing dedicated hardware and hard-coded algorithms (Silber9).

   T / F Embedded algorithms in a device controller could conflict with the applications, causing decreased performance (Silber 9).

   T / F Polling for an I/O completion can waste a large number of CPU cycles if the processor iterates a busy-waiting loop many times before the I/O completes (Silber9).

   T / F DMA (Direct Memory Access) increases system concurrency (Silber9).

   T / F The STREAMS driver modifies the flow of data between the user interface and the driver (Silber9).

   T / F Device driver encapsulate device details to avoid uniform device-access interface to I/O subsystem (Silber9).

   T / F An asynchronous process suspended until I/O completed (Silber9).

2. **2016-1b**

   Lingkari atau beri silang huruf "**B**" jika betul, dan "**S**" jika salah.

```
001 /* (c) 2015-2019 Rahmat M. Samik-Ibrahim    *
002  * R: 27-Feb-2019  -- This is free software */
004 #include <stdio.h>
005 #include <string.h>
006 #include <unistd.h>
007 #include <fcntl.h>
008 #include <sys/types.h>
009 #include <sys/stat.h>
010
011 char *string = "ABCD\n";
012 void main(void) {
013    int   fileDescriptor;
014    close(STDOUT_FILENO);
015    fileDescriptor = open ("output.txt", O_RDWR|O_CREAT|O_TRUNC, 0644);
016    printf (        "%s", string);
017    write(fileDescriptor, string, strlen(string));
018 }
```

B / S Tanpa baris 004 - 009, program akan tetap dapat dikompilasi tanpa kesalahan (error).

B / S Pointer "string" (baris 011) merupakan variabel global.

B / S Deklarasi "main(void)" (baris 12) artinya: tidak ada "passing argument" ke dalam fungsi main().

B / S Pada saat program dieksekusi, secara otomatis file descriptor dari streams stdin=0 (STDIN_FILENO), stdout=1 (STDOUT_FILENO), dan stderr=2 (STDERR_FILENO).

B / S Baris 14 akan menutup stream STDOUT_FILENO (1).

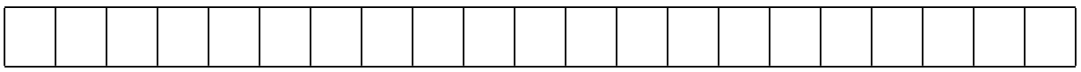
B / S Nilai "fileDescriptor" = 1 (baris 15), akibat baris no 14.

B / S Jika berkas "output.txt" tidak ada (baris 15), maka fungsi open() akan membuat berkas "output.txt" baru.

B / S Jika sudah ada berkas "output.txt" (baris 15), maka fungsi open() akan membuka berkas dengan mode menambah (append).

B / S Fungsi "printf()" (baris 16) akan menulis "ABCD\n" ke layar monitor.

Isi semula berkas "output.txt" ialah "XXXX\n"; maka setelah program dieksekusi akan berisi:



3. **2017-1**

C Programing

```
001 /*
002  * (c) 2017 Rahmat M. Samik-Ibrahim --
           This is free software
003  * REV00 Thu Mar 30 16:56:54 WIB 2017
004  * START Thu Mar 30 16:56:54 WIB 2017
005  *
006  * fd2=dup(fd1)  duplicates fd1 to fd2
007  * O_RDWR Open the file so that it can be read
               from and written to.
008  * O_TRUNC Initially clear all data from the file.
009  * O_CREAT If the file does not exist, create it.
010  */
011
012 #include <stdio.h>
013 #include <unistd.h>
014 #include <sys/types.h>
015 #include <sys/stat.h>
016 #include <fcntl.h>
017 #include <string.h>
018 #define FILE "uts2017-1.txt"
020 static char* str1 = "AABB\n";
021 static char* str2 = "CCDD\n";
022 static char* str3 = "EEFF\n";
023
024 void main(void) {
025    int fd1, fd2, fd3;
026    /* STDIN=0, STDOUT=1, STDERR=2, therefore
027       fd1, fd2, fd3  will be 3, 4, and 5 */
028    fd1 = open (FILE, O_TRUNC | O_RDWR | O_CREAT, 0644);
029    fd2 = open (FILE, O_TRUNC | O_RDWR | O_CREAT, 0644);
030    fd3 = dup(fd2);
031    printf("fd1=%d, fd2=%d, fd3=%d\n", fd1, fd2, fd3);
032    write(fd1, str1, strlen(str1));
033    write(fd2, str2, strlen(str2));
034    write(fd3, str3, strlen(str3));
035    close(fd1);
036    close(fd2);
037    close(fd3);
038 }
```

Program Output (Line 031):

Content of file "uts2017-1.txt"

4. **2017-2**

C Programing I/O

```
001 /*
002  * (c) 2017 Rahmat M. Samik-Ibrahim
003  * http://rahmatm.samik-ibrahim.vlsm.org/
004  * This is free software.
005  * REV00 Wed Oct 18 18:20:27 WIB 2017
006  * START Wed Oct 18 18:20:27 WIB 2017
007
008  write (fd, "string", string_lenght);
009  duplicate = dup (fd);
010  */
011
012 #include <stdio.h>
013 #include <unistd.h>
014 #include <sys/types.h>
015 #include <sys/stat.h>
016 #include <fcntl.h>
017 #include <string.h>
018 #define FILE "file.txt"
019
020 void main(void) {
021    int fd1, fd2;
022    fd1 = open (FILE, O_RDWR | O_CREAT | O_TRUNC, 0644);
023    fd2 = dup(fd1);
024    write (fd1, "012345\n", 5);
025    write (fd2, "abcdef\n", 5);
026    close(fd1);
027    close(fd2);
028 }
```

Inside FILE (file.txt)

5. **2018-1**

```
001 /*
002  Copyright 2018 Rahmat M. Samik-Ibrahim
003  You are free to SHARE (copy and
004  redistribute the material in any medium
005  or format) and to ADAPT (remix,
006  transform, and build upon the material
007  for any purpose, even commercially).
008  This program is distributed in the hope
009  that it will be useful, but WITHOUT ANY
010  WARRANTY; without even the implied
011  warranty of MERCHANTABILITY or FITNESS
012  FOR A PARTICULAR PURPOSE.
013
014  * REV03 Fri May 18 20:17:20 WIB 2018
015  * REV01 Wed Apr 18 19:50:01 WIB 2018
016  * START Thu Mar 30 16:56:54 WIB 2017
017
018  * fd2 = dup(fd1)  duplicates fd1 to fd2
       dprintf(fd,...)=printf(...) to fd
019  * O_RDWR   Open the file so that it can
020             be read from and written to.
021  * O_TRUNC  Initially clear all data from
022             the file.
023  * O_CREAT  If the file does not exist,
024             create it.
025  */
027 #include <stdio.h>
028 #include <unistd.h>
029 #include <fcntl.h>
030 #include <string.h>
031 #define FLAGS O_RDWR|O_TRUNC|O_CREAT
032 #define FILE "demo-file.txt"
033
034 static char* str1 = "AAAAAAAAAA";
035 static char* str2 = "BBBBB";
036
037 void main(void) {
038    int fd1, fd2, fd3;
039    /* STDIN=0, STDOUT=1, STDERR=2,
040       fd1,fd2,fd3  will be 3,4,and 5 */
041    fd1=open(FILE, FLAGS, 0644);
042    fd2=open(FILE, FLAGS, 0644);
043    fd3=dup(fd1);
044    dprintf(fd1,"%s",       str1);
045    dprintf(fd2,"%d %d %d ",fd1,fd2,fd3);
046    dprintf(fd3,"%s",       str2);
047    close(fd1);
048    close(fd2);
049    close(fd3);
050 }
```

Content of file "demo-file.txt" (One character per box):

6. **2018-2**

```
001 // FILE: 40-io.c ================ ===
002 // Copyright (C) 2018 Rahmat M. Samik-Ibrahim.
003 /* You are free to SHARE (copy and redistribute the material in any medium or format) and to ADAPT (remix, transform, and build upon the material for any purpose, even commercially). This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. */

007 // REV03 Sun Dec 16 22:10:40 WIB 2018
008 // START Thu Dec 12 19:55:08 WIB 2018
009
010 #include <fcntl.h>
011 #include <stdio.h>
012 #include <unistd.h>
013 #include <sys/types.h>
014 #include <sys/stat.h>
015
016 #define MODES 0644
017 #define FLAGS O_RDWR|O_CREAT|O_TRUNC
019 #define FILE3 "zdemo3.txt"
020 #define FILE4 "zdemo4.txt"
021
022 void main(void) {
023    int fd3 = open (FILE3,FLAGS,MODES);
024    int fd4 = open (FILE4,FLAGS,MODES);
025    dprintf(fd3, "fd%d\n", fd3);
026    dprintf(fd4, "fd%d\n", fd4);
027    close(STDOUT_FILENO); // STDOUT = 1
028    int fd1 = dup(fd3);
029    close(STDERR_FILENO); // STDERR = 2
030    int fd2 = dup(fd4);
031    dprintf(fd1, "fd%d\n", fd1);
032    dprintf(fd2, "fd%d\n", fd2);
033    close (fd1);
034    close (fd2);
035    close (fd3);
036    close (fd4);
037 }
```

Content of file "zdemo3.txt" (One character per box):

Content of file "zdemo4.txt" (One character per box):

7. **2019-1 (82.3%)**

```
001 // (c) 2019 This is Free Software R01
002 // Rahmat M. Samik-Ibrahim 20190515-12:40
003 //
004
005 #include <fcntl.h>
006 #include <stdio.h>
007 #include <sys/stat.h>
008 #include <sys/types.h>
009 #include <unistd.h>
010
011 #define FILE    "file.txt"
012 #define STRING1 "AAABBBCCC"
013 #define STRING2 "DDDEEEFFF"
014 #define STRING3 "GGGHHHIII"
016 void main(void) {
017    int fd1=open(FILE,
        O_CREAT|O_TRUNC|O_RDWR, 0644);
018    int fd2=open(FILE,
        O_CREAT|O_TRUNC|O_RDWR, 0644);
019    int fd3=open(FILE,
        O_CREAT|O_TRUNC|O_RDWR, 0644);
020    write (fd1,STRING1, 9);
021    write (fd2,STRING2, 6);
022    write (fd3,STRING3, 3);
023    close(fd1);
024    close(fd2);
025    close(fd3);
026 }
```

Content of file "file.txt" (One character per box):

8. **2019-2 (55%)**

```
001 // (c) 2019 This is Free Software R01
002 // Rahmat M. Samik-Ibrahim 20191216-1555
003 // R01 1217 2000
004
005 // File Name: 76-192.c
006 // To run:  ./76-192
007
008 #include <stdio.h>
009 #include <unistd.h>
010 #include <sys/types.h>
011 #include <sys/stat.h>
012 #include <fcntl.h>
013 #include <string.h>
014 #define FILE1 "zdemo1.txt"
```

```
016 void main(void) {
017    printf ("OUT=%d\n", STDOUT_FILENO);
018    close(STDOUT_FILENO);
019    int fd1 = open (FILE1, O_RDWR |
020               O_CREAT | O_TRUNC, 0644);
021    int fd2 = dup2(fd1, 9);
022    printf(         "A\n");
023    fprintf(stdout, "B\n");
024    dprintf(fd2,    "fd1=%d\nfd2=%d\n",
025                              fd1, fd2);
026 }
```

Content of file "zdemo1.txt" (One character per box):