

10 IONet - I/O & Network Programing Aneka Soal Ujian Sistem Operasi BinKadal, Sdn. Bhd. (editor)

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1. **2016-1**a

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;
       close(STDOUT_FILENO);
014
      fileDescriptor = open ("output.txt", O_RDWR|O_CREAT|O_TRUNC, 0644);
015
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).
- \mathbf{B} / \mathbf{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: |
|---------------------|-------------|-------|-------|------|--------------|---------|------------|------|---------|
|---------------------|-------------|-------|-------|------|--------------|---------|------------|------|---------|

| 1 | | | | | | | | | | | |
|---|---|--|--|--|--|--|--|--|--|--|--|
| | 1 | | | | | | | | | | |
| | 1 | | | | | | | | | | |
| | | | | | | | | | | | |

3. **2017-1**

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

str1);

str2);

4. **2017-2**

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

5. **2018-1**

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

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

001 // FILE: 40-io.c =======

013 #include <sys/types.h>

014 #include <sys/stat.h>

016 #define MODES 0644

6. **2018-2**

015

```
019 #define FILE3 "zdemo3.txt"
002 // Copyright (C) 2018 Rahmat M. Samik-Ibrahim.
                                                      020 #define FILE4 "zdemo4.txt"
003 /* You are free to SHARE (copy and redistribute the mate-
                                                      021
rial in any medium or format) and to ADAPT (remix, transform, and
                                                      022 void main(void) {
build upon the material for any purpose, even commercially). This
                                                      023
                                                              int fd3 = open (FILE3,FLAGS,MODES);
program is distributed in the hope that it will be useful, but WITH-
                                                      024
                                                              int fd4 = open (FILE4,FLAGS,MODES);
OUT ANY WARRANTY; without even the implied warranty of MER-
                                                              dprintf(fd3, "fd%d\n", fd3);
                                                      025
CHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. */
                                                      026
                                                              dprintf(fd4, "fd%d\n", fd4);
                                                      027
                                                              close(STDOUT_FILENO); // STDOUT = 1
007 // REV03 Sun Dec 16 22:10:40 WIB 2018
                                                      028
                                                              int fd1 = dup(fd3);
008 // START Thu Dec 12 19:55:08 WIB 2018
                                                              close(STDERR_FILENO); // STDERR = 2
                                                      029
009
                                                      030
                                                              int fd2 = dup(fd4);
010 #include <fcntl.h>
                                                      031
                                                              dprintf(fd1, "fd%d\n", fd1);
011 #include <stdio.h>
                                                      032
                                                              dprintf(fd2, "fd%d\n", fd2);
012 #include <unistd.h>
                                                              close (fd1);
                                                      033
```

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

017 #define FLAGS O_RDWR|O_CREAT|O_TRUNC



034

035

036

037 }

close (fd2);

close (fd3);

close (fd4);

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



7. 2019-1 (82.3%)

```
001 // (c) 2019 This is Free Software R01
                                                  016 void main(void) {
002 // Rahmat M. Samik-Ibrahim 20190515-12:40
                                                  017
                                                         int fd1=open(FILE,
003 //
                                                          O_CREAT|O_TRUNC|O_RDWR, 0644);
004
                                                         int fd2=open(FILE,
                                                  018
005 #include <fcntl.h>
                                                          O_CREAT|O_TRUNC|O_RDWR, 0644);
006 #include <stdio.h>
                                                  019
                                                         int fd3=open(FILE,
007 #include <sys/stat.h>
                                                          O_CREAT|O_TRUNC|O_RDWR, 0644);
008 #include <sys/types.h>
                                                  020
                                                         write (fd1,STRING1, 9);
009 #include <unistd.h>
                                                  021
                                                         write (fd2,STRING2, 6);
010
                                                  022
                                                         write (fd3,STRING3, 3);
011 #define FILE
                    "file.txt"
                                                  023
                                                         close(fd1);
012 #define STRING1 "AAABBBCCC"
                                                  024
                                                         close(fd2);
013 #define STRING2 "DDDEEEFFF"
                                                  025
                                                         close(fd3);
014 #define STRING3 "GGGHHHIII"
                                                  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
                                                 016 void main(void) {
004
                                                 017
                                                        printf ("OUT=%d\n", STDOUT_FILENO);
005 // File Name: 76-192.c
                                                 018
                                                        close(STDOUT_FILENO);
006 // To run: ./76-192
                                                        int fd1 = open (FILE1, O_RDWR |
                                                 019
007
                                                                   O_CREAT | O_TRUNC, 0644);
                                                 020
008 #include <stdio.h>
                                                 021
                                                        int fd2 = dup2(fd1, 9);
009 #include <unistd.h>
                                                 022
                                                        printf(
                                                                         "A\n");
010 #include <sys/types.h>
                                                 023
                                                        fprintf(stdout, "B\n");
011 #include <sys/stat.h>
                                                        dprintf(fd2,
                                                                        "fd1=%d\nfd2=%d\n",
                                                 024
012 #include <fcntl.h>
                                                 025
                                                                                  fd1, fd2);
013 #include <string.h>
                                                 026 }
014 #define FILE1 "zdemo1.txt"
```

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

| | | | | | | | | | l |
|--|--|--|--|--|--|--|--|--|---|
| | | | | | | | | | 1 |
| | | | | | | | | | l |
| | | | | | | | | | l |
| | | | | | | | | | l |