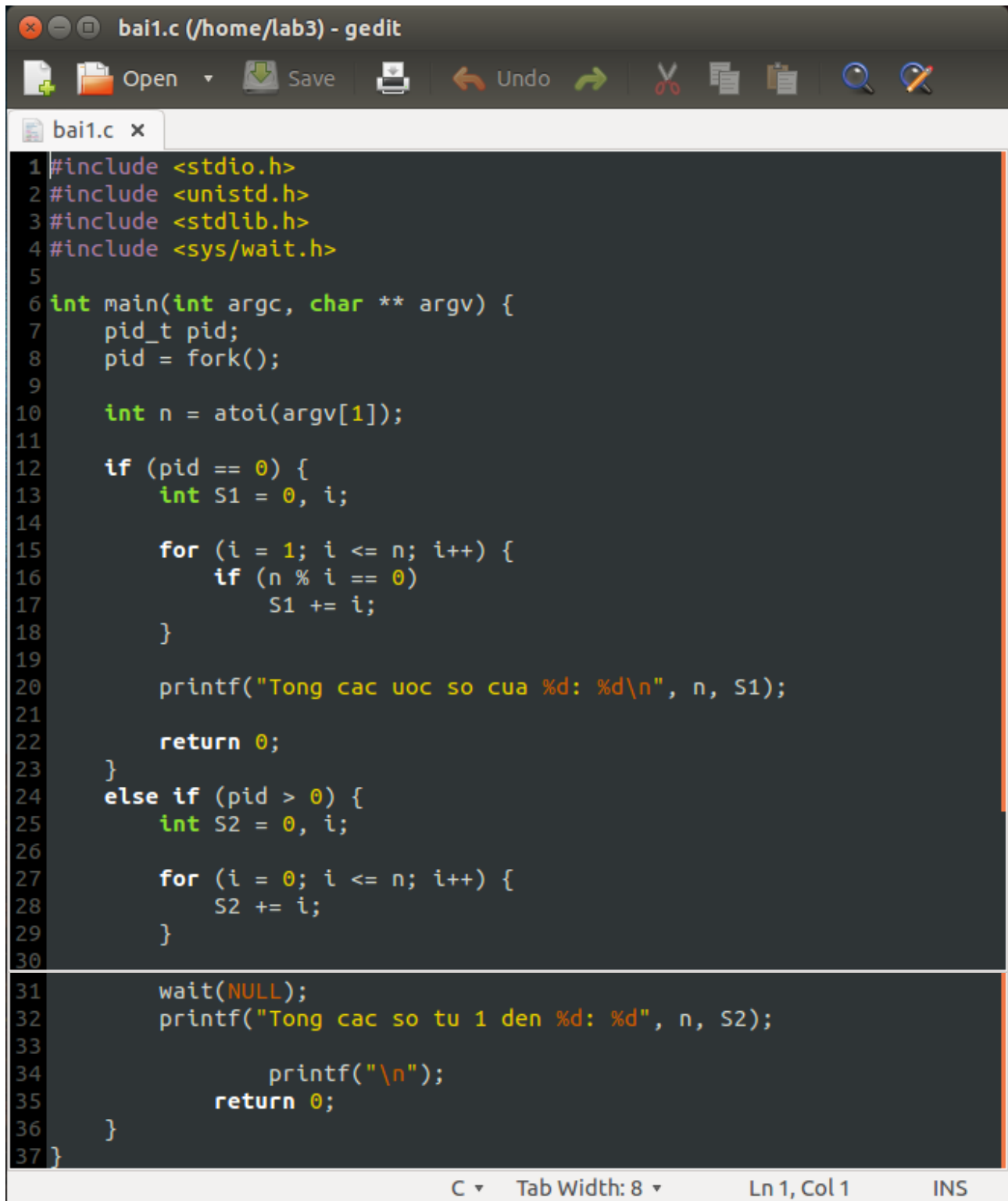


BÁO CÁO THỰC HÀNH

Buổi 3

Môn:	Nhập môn Hệ điều hành
Nhóm:	N3T01
Họ và tên:	Lưu Hữu Trí
MSSV:	52200167
Số bài hoàn thành:	4/4 (100%)

Câu 1:



```
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <stdlib.h>
4 #include <sys/wait.h>
5
6 int main(int argc, char ** argv) {
7     pid_t pid;
8     pid = fork();
9
10    int n = atoi(argv[1]);
11
12    if (pid == 0) {
13        int S1 = 0, i;
14
15        for (i = 1; i <= n; i++) {
16            if (n % i == 0)
17                S1 += i;
18        }
19
20        printf("Tong cac uoc so cua %d: %d\n", n, S1);
21
22        return 0;
23    }
24    else if (pid > 0) {
25        int S2 = 0, i;
26
27        for (i = 0; i <= n; i++) {
28            S2 += i;
29        }
30
31        wait(NULL);
32        printf("Tong cac so tu 1 den %d: %d", n, S2);
33
34        printf("\n");
35        return 0;
36    }
37 }
```

C ▾ Tab Width: 8 ▾ Ln 1, Col 1 INS

```
root@ubuntu: /home/lab3
root@ubuntu:/home/lab3# gcc -c bai1.c
root@ubuntu:/home/lab3# gcc -o bai1.out bai1.o
root@ubuntu:/home/lab3# ./bai1.out 12
Tong cac uoc so cua 12: 28
Tong cac so tu 1 den 12: 78
root@ubuntu:/home/lab3# ./bai1.out 23
Tong cac uoc so cua 23: 24
Tong cac so tu 1 den 23: 276
root@ubuntu:/home/lab3# ./bai1.out 21
Tong cac uoc so cua 21: 32
Tong cac so tu 1 den 21: 231
root@ubuntu:/home/lab3#
```

Câu 2:

```
bai2.c (/home/lab3) - gedit
Open Save Undo
bai1.c x bai2.c x
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <unistd.h>
4 #include <sys/wait.h>
5
6 int main(int argc, char ** argv) {
7     pid_t pid = fork();
8
9     int n = atoi(argv[1]);
10
11     if (pid == 0) {
12         printf("%d, ", n);
13         while (n != 1) {
14             if (n % 2 != 0) {
15                 n = 3*n + 1;
16                 printf("%d", n);
17                 if (n != 1) {
18                     printf(", ");
19                 }
20             }
21             else {
22                 n /= 2;
23                 printf("%d", n);
24                 if (n != 1) {
25                     printf(", ");
26                 }
27             }
28         }
29     }
```

```
29
30     printf("\nTien trinh con ket thuc");
31
32     return 0;
33 }
34 else if (pid > 0) {
35     wait(NULL);
36
37     return 0;
38 }
39 }
```

C ▾

Tab Width: 8 ▾

Ln 8, Col 1

INS

root@ubuntu: /home/lab3

root@ubuntu:/home/lab3# gcc -c bai2.c

root@ubuntu:/home/lab3# gcc -o bai2.out bai2.o

root@ubuntu:/home/lab3# ./bai2.out 12

12, 6, 3, 10, 5, 16, 8, 4, 2, 1

Tien trinh con ket thuc

root@ubuntu:/home/lab3# ./bai2.out 121

121, 364, 182, 91, 274, 137, 412, 206, 103, 310, 155, 466, 233, 700, 350,
175, 526, 263, 790, 395, 1186, 593, 1780, 890, 445, 1336, 668, 334, 167,
502, 251, 754, 377, 1132, 566, 283, 850, 425, 1276, 638, 319, 958, 479,
1438, 719, 2158, 1079, 3238, 1619, 4858, 2429, 7288, 3644, 1822, 911, 273
4, 1367, 4102, 2051, 6154, 3077, 9232, 4616, 2308, 1154, 577, 1732, 866,
433, 1300, 650, 325, 976, 488, 244, 122, 61, 184, 92, 46, 23, 70, 35, 106
, 53, 160, 80, 40, 20, 10, 5, 16, 8, 4, 2, 1

Tien trinh con ket thuc

root@ubuntu:/home/lab3#

Câu 3:

```
bai3.c (/home/lab3) - gedit
File Edit View Search Tools Documents Help
Open Save Undo
bai3.c x
1 #include <stdio.h>
2 #include <unistd.h>
3 #include <sys/wait.h>
4
5 int main(int argc, char ** argv) {
6     pid_t pid_B = fork();
7
8     //B
9     if (pid_B == 0) {
10         printf("\t- B[Pid:%d, PPid:%d]\n", getpid(), getppid());
11
12         pid_t pid_D = fork();
13         //D
14         if (pid_D == 0) {
15             printf("\t\t+ D[Pid:%d, PPid:%d]\n", getpid(), getppid());
16
17         }
18         //B
19         else if (pid_D > 0) {
20             wait(NULL);
21             pid_t pid_E = fork();
22
23             //E
24             if (pid_E == 0) {
25                 printf("\t\t+ E[Pid:%d, PPid:%d]", getpid(), getppid());
26             }
27             //B
28             else if (pid_E > 0) {
29                 wait(NULL);
30                 return 0;
31             }
32         }
33     }
34
35     //A
36     else if (pid_B > 0) {
37         printf("> A[%d]\n", getpid());
38         wait(NULL);
39
40         pid_t pid_C = fork();
41         //C
42         if (pid_C == 0) {
43             printf("\t- C[Pid:%d, PPid:%d]\n", getpid(), getppid());
44             wait(NULL);
45
46             pid_t pid_H = fork();
47             //H
48             if (pid_H == 0) {
49                 printf("\t\t+ H[Pid:%d, PPid:%d]\n", getpid(), getppid());
50             }
51             //C
52             else if (pid_H > 0) {
53                 wait(NULL);
```

```

54     }
55 }
56 //A
57 else if (pid_C > 0) {
58     printf("\n");
59     return 0;
60 }
61 }
62 }

```

Bracket match found on line: 5

C ▾

Tab Width: 4 ▾

Ln 62, Col 2

INS

root@ubuntu: /home/lab3

root@ubuntu:/home/lab3# gcc -c bai3.c

root@ubuntu:/home/lab3# gcc -o bai3.out bai3.o

root@ubuntu:/home/lab3# ./bai3.out

> A[5070]

```

- B[Pid:5071, PPid:5070]
  + D[Pid:5072, PPid:5071]

```

```

- C[Pid:5074, PPid:3532]
  + E[Pid:5073, PPid:3532]

```

root@ubuntu:/home/lab3# + H[Pid:5075, PPid:5074]

./bai3.out

> A[5076]

```

- B[Pid:5077, PPid:5076]
  + D[Pid:5078, PPid:5077]
  + E[Pid:5079, PPid:5077]

```

```

- C[Pid:5080, PPid:3532]
  + H[Pid:5081, PPid:5080]

```

root@ubuntu:/home/lab3# |

Câu 4:

```
File Edit View Search Tools Documents Help
Open Save Undo
bai4.c x
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <unistd.h>
4 #include <sys/time.h>
5 #include <sys/wait.h>
6 #include <sys/types.h>
7
8 struct timeval t_before, t_after, t_final;
9 int main(int argc, char **argv) {
10     gettimeofday(&t_before, NULL);
11
12     int pid = fork();
13     if (pid == 0) {
14         system(argv[1]);
15     }
16     else if (pid > 0) {
17         wait(NULL);
18         gettimeofday(&t_after, NULL);
19         timersub(&t_after, &t_before, &t_final);
20         printf("Execution time: %ld.%.6ld\n", (long int)t_final.tv_sec, (long int)t_final.tv_usec);
21     }
22 }
23 }
```

```
root@ubuntu: /home/lab3
root@ubuntu:/home/lab3# gcc -c bai4.c
root@ubuntu:/home/lab3# gcc -o bai4.out bai4.o
root@ubuntu:/home/lab3# ./bai4.out
Execution time: 0.001594
root@ubuntu:/home/lab3# ./bai4.out ls
a.out    bai1.o    bai2.c~   bai3.c    bai3.out  bai4.o    test.c~
bai1.c    bai1.out  bai2.o    bai3.c~   bai4.c    bai4.out
bai1.c~   bai2.c    bai2.out  bai3.o    bai4.c~   test2.c~
Execution time: 0.003005
root@ubuntu:/home/lab3# ./bai4.out ls ps
a.out    bai1.o    bai2.c~   bai3.c    bai3.out  bai4.o    test.c~
bai1.c    bai1.out  bai2.o    bai3.c~   bai4.c    bai4.out
bai1.c~   bai2.c    bai2.out  bai3.o    bai4.c~   test2.c~
Execution time: 0.001782
root@ubuntu:/home/lab3#
```