

Project 3

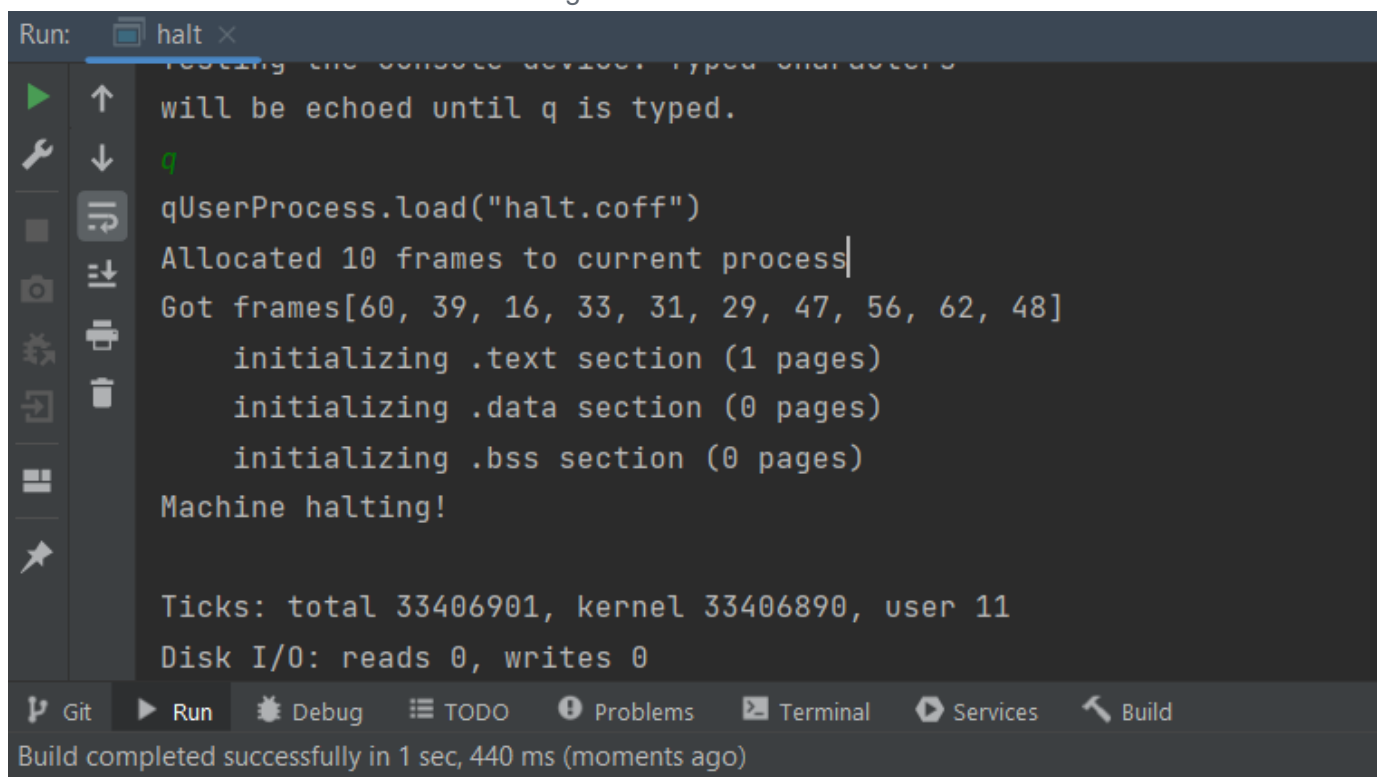
Name: Khai Dong

Part 1: Gradescope

(See Gradescope)

Part 2: Page it!

Here is the screenshot of `halt.coff` running in NACHOS.



```
Run: halt x
Testing the console device. Typed characters
will be echoed until q is typed.
q
qUserProcess.load("halt.coff")
Allocated 10 frames to current process|
Got frames[60, 39, 16, 33, 31, 29, 47, 56, 62, 48]
    initializing .text section (1 pages)
    initializing .data section (0 pages)
    initializing .bss section (0 pages)
Machine halting!

Ticks: total 33406901, kernel 33406890, user 11
Disk I/O: reads 0, writes 0
```

Part 3: System Calls

The screenshots of the working program are below

`power.coff`

```
Run: power x
WARNING: System::setSecurityManager will be removed in a future release
processor console user-check grader
Testing the console device. Typed characters
will be echoed until q is typed.
q
qUserProcess.load("power.coff")
Allocated 14 frames to current process
Got frames[16, 1, 15, 5, 44, 34, 58, 57, 27, 42, 37, 19, 40, 4]
initializing .text section (3 pages)
initializing .rdata section (1 pages)
initializing .data section (0 pages)
initializing .bss section (1 pages)
base: 3
3
exponent: 2
2
3^2 = 9
Machine halting!

Ticks: total 82502734, kernel 61403740, user 21098994
Disk I/O: reads 0, writes 0
Console I/O: reads 6, writes 29
Paging: page faults 0, TLB misses 0
Network I/O: received 0, sent 0

Process finished with exit code 0
```

search_for_e.coff

```
Run: search_for_e ×
WARNING: System::setSecurityManager will be removed in a future release
↑ user-check grader
↓ Testing the console device. Typed characters
will be echoed until q is typed.
q
qUserProcess.load("search_for_e.coff")
Allocated 14 frames to current process
Got frames[59, 0, 45, 39, 62, 43, 16, 5, 38, 31, 36, 51, 37, 21]
    initializing .text section (3 pages)
    initializing .rdata section (1 pages)
    initializing .data section (0 pages)
    initializing .bss section (1 pages)

word to search: 3456e12e
3456e12e
found at index 4
Machine halting!

Ticks: total 198285542, kernel 132513580, user 65771962
Disk I/O: reads 0, writes 0
Console I/O: reads 11, writes 43
Paging: page faults 0, TLB misses 0
Network I/O: received 0, sent 0

Process finished with exit code 0
```

sort_large.coff

```
Run: sort_large ×
WARNING: Please consider reporting this to the maintainers of nachos.security.NachosSecurityManager$1
WARNING: System::setSecurityManager will be removed in a future release
grader
Testing the console device. Typed characters
will be echoed until q is typed.
q
qUserProcess.load("sort_large.coff")
Allocated 46 frames to current process
Got frames[34, 17, 20, 28, 16, 58, 7, 25, 60, 11, 26, 27, 55, 19, 53, 10, 31, 32, 43, 54, 57, 1, 24, 63, 46, 52, 42, 12, 23, 33, 6, 36, 5, 2, 3, 21, 45, 39, 59, 49, 14, 13, 40, 8, 29, 62]
    initializing .text section (3 pages)
    initializing .rdata section (1 pages)
    initializing .data section (0 pages)
    initializing .bss section (33 pages)

SUCCESS
Machine halting!

Ticks: total 49963481, kernel 49300950, user 662531
Disk I/O: reads 0, writes 0
Console I/O: reads 2, writes 9
Paging: page faults 0, TLB misses 0
Network I/O: received 0, sent 0

Process finished with exit code 0
```

sort_medium.coff

```
Run: sort_medium x
console user-check grader
Testing the console device. Typed characters
will be echoed until q is typed.
q
qUserProcess.load("sort_medium.coff")
Allocated 18 frames to current process
Got frames[36, 34, 59, 19, 17, 51, 60, 48, 31, 1, 49, 4, 38, 62, 21, 54, 13, 8]
    initializing .text section (3 pages)
    initializing .rdata section (1 pages)
    initializing .data section (0 pages)
    initializing .bss section (5 pages)
... 996 997 998 999
Sort Succeeded!
Machine halting!

Ticks: total 52169622, kernel 43149360, user 9020262
Disk I/O: reads 0, writes 0
Console I/O: reads 2, writes 38
Paging: page faults 0, TLB misses 0
Network I/O: received 0, sent 0

Process finished with exit code 0
```

sort_small.coff

```
Run: sort_small x
WARNING: Please consider reporting this to the maintainers of nacl03.security.nacl03security.
WARNING: System::setSecurityManager will be removed in a future release
Testing the console device. Typed characters
will be echoed until q is typed.
q
qUserProcess.load("sort_small.coff")
Allocated 14 frames to current process
Got frames[42, 41, 8, 48, 63, 0, 17, 33, 55, 29, 6, 50, 28, 7]
    initializing .text section (3 pages)
    initializing .rdata section (1 pages)
    initializing .data section (0 pages)
    initializing .bss section (1 pages)
0 1 2 3 4 5 6 7 8 9
Sort Succeeded!
Machine halting!

Ticks: total 34039231, kernel 34034580, user 4651
Disk I/O: reads 0, writes 0
Console I/O: reads 2, writes 38
Paging: page faults 0, TLB misses 0
Network I/O: received 0, sent 0

Process finished with exit code 0
```

sort_too_much.coff

```
Run: sort_too_much x
nachos 5.0j initializing... config interrupt timer processor console user-checkWARNING: A
WARNING: System::setSecurityManager has been called by nachos.security.NachosSecurityMana
WARNING: Please consider reporting this to the maintainers of nachos.security.NachosSecur
WARNING: System::setSecurityManager will be removed in a future release
grader
Testing the console device. Typed characters
will be echoed until q is typed.
q
qUserProcess.load("sort_too_much.coff")
insufficient physical memory

nachos.machine.AssertionFailureError Create breakpoint
    at nachos.machine.Lib.assertTrue(Lib.java:77)
    at nachos.userprog.UserKernel.run(UserKernel.java:115)
    at nachos.ag.AutoGrader.run(AutoGrader.java:153)
    at nachos.ag.AutoGrader.start(AutoGrader.java:50)
    at nachos.machine.Machine$1.run(Machine.java:62)
    at nachos.machine.TCB.threadroot(TCB.java:235)
    at nachos.machine.TCB.start(TCB.java:118)
    at nachos.machine.Machine.main(Machine.java:61)

Process finished with exit code 0
```

fib.coff

This program prompts the first 2 numbers $f(1)$ and $f(2)$ of a Fibonacci sequence and an n , and compute the $f(n)$, the n th Fibonacci number. n can be as large as the max of unsigned int and will still give reasonable runtime, but too large of a number can't be stored in `int`.

The Fibonacci sequence up to the 8th number is 1 1 2 3 5 8 13 21

```
Run: fib x
▶ ↑ Allocated 15 frames to current process
⚙ ↓ Got frames[60, 62, 25, 9, 34, 22, 17, 63, 3, 1, 11, 27, 46, 36, 15]
■ ⚙ initializing .text section (4 pages)
📷 ⚙ initializing .rdata section (1 pages)
⚙ ⚙ initializing .data section (0 pages)
⚙ ⚙ initializing .bss section (1 pages)
➡ 🗑 f(1): 1
1
f(2): 1
1
n: 8
8
f(8): 21
Machine halting!

Ticks: total 70685577, kernel 41978060, user 28707517
Disk I/O: reads 0, writes 0
Console I/O: reads 8, writes 31
Paging: page faults 0, TLB misses 0
Network I/O: received 0, sent 0

Process finished with exit code 0
```

If given a number less than 1, exit the program. Test system call `exit()` .

```
Run: fib x
qUserProcess.load("fib.coff")
Allocated 15 frames to current process
Got frames[22, 4, 50, 41, 42, 7, 17, 55, 24, 8, 56, 40, 15, 52, 62]
    initializing .text section (4 pages)
    initializing .rdata section (1 pages)
    initializing .data section (0 pages)
    initializing .bss section (1 pages)
f(1): 1
1
f(2): 1
1
n: 0
0
invalid inputFrame 22 freed
Frame 4 freed
Frame 50 freed
Frame 41 freed
Frame 42 freed
Frame 7 freed
Frame 17 freed
Frame 55 freed
Frame 24 freed
Frame 8 freed
Frame 56 freed
Frame 40 freed
Frame 15 freed
Frame 52 freed
Frame 62 freed
Machine halting!

Ticks: total 51386069, kernel 29770160, user 21615909
Disk I/O: reads 0, writes 0
Console I/O: reads 8, writes 35
Paging: page faults 0, TLB misses 0
Network I/O: received 0, sent 0

Process finished with exit code 0
|
```