

CS480

Translators

Introduction to Compilers

Milestone I - *gforth*

Your First Milestone

- Learn a new language, *gforth*
- Get a Makefile working
- Write a Milestone report

Why learn a new language?

- Different language paradigms
- This is our target code

What is Forth?

- Imperative
- Stack-based
- Postfix (Reverse Polish Notation)

$1 + 2 * 3$

1 2 3 * +

- How about $3 / 1 + 4 * 2$?

Handwritten red annotations illustrating stack operations for the expression $3 / 1 + 4 * 2$:

- A red oval contains the expression $1 * 2 3$, with a red arrow pointing from it to the next line.
- The next line shows $1 2 3$ with a red arrow pointing from the 1 to the 2 , and a red arrow pointing from the 2 to the 3 .
- Below this, there is a large, messy red scribble that appears to be a stack diagram or a series of scribbles.

Gforth

- How does it work?
 - Command Line
 - Files

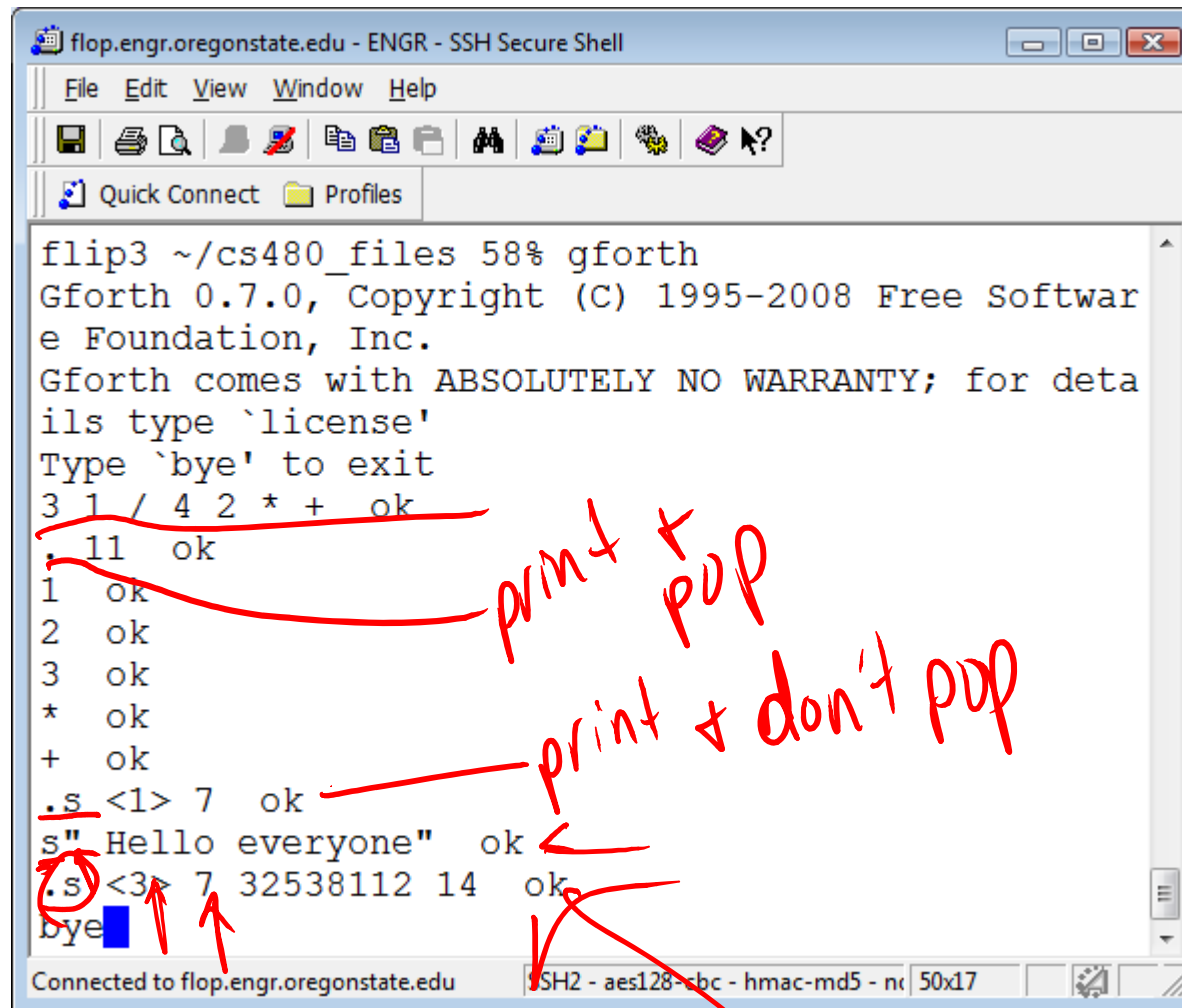
Old Desk Calculators

```
flop.engr.oregonstate.edu - ENGR - SSH Secure Shell
File Edit View Window Help
[Icons]
Quick Connect Profiles

flip3 ~/cs480_files 68% dc
1
2
+
p
3
1 2 +
p
3
P
p
3
P
p
dc: stack empty
quit
flip3 ~/cs480_files 69%

Connected to flop.engr.oregonstate.edu  SSH2 - aes128-cbc - hmac-md5 - nc 47x17
```

Starting/Using Gforth



```
flop.engr.oregonstate.edu - ENGR - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

flip3 ~/cs480_files 58% gforth
Gforth 0.7.0, Copyright (C) 1995-2008 Free Software
Foundation, Inc.
Gforth comes with ABSOLUTELY NO WARRANTY; for deta
ils type `license'
Type `bye' to exit
3 1 / 4 2 * + ok
; 11 ok
1 ok
2 ok
3 ok
* ok
+ ok
.s <1> 7 ok
s" Hello everyone" ok
.s <3> 7 32538112 14 ok
bye
```

Handwritten red annotations:

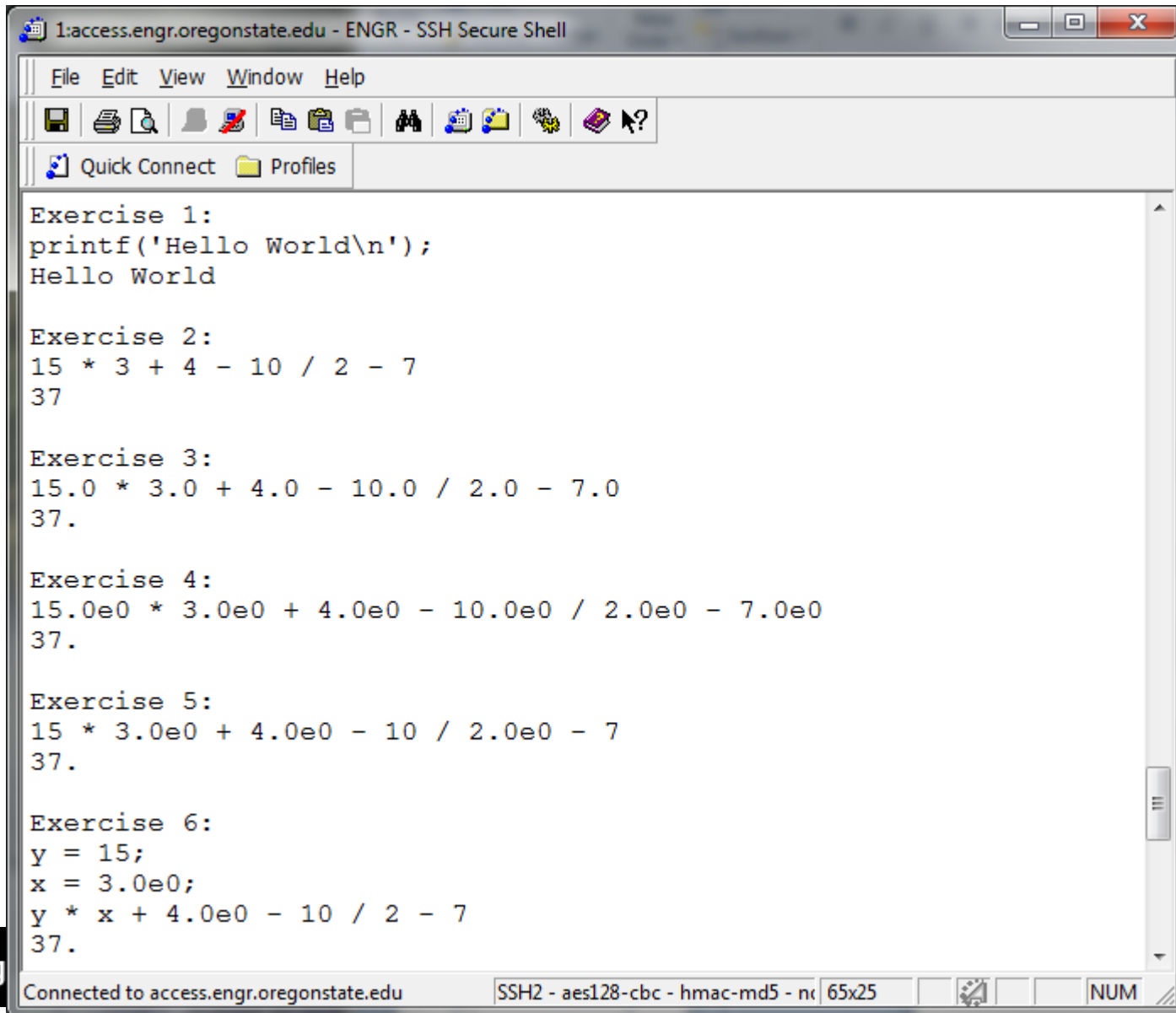
- A red line underlines the input `3 1 / 4 2 * + ok`.
- A red arrow points from the text `print + pop` to the `11` in the output `; 11 ok`.
- A red arrow points from the text `print + don't pop` to the `7` in the output `.s <1> 7 ok`.
- A red circle is drawn around the `.s` in the input `.s <3> 7 32538112 14 ok`.
- A red arrow points from the text `print + don't pop` to the `bye` input.

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Makefile Example

- Four Targets
 - compile
 - clean
 - stutest.out
 - proftest.out

Example stutest.out



```
1:access.engr.oregonstate.edu - ENGR - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

Exercise 1:
printf('Hello World\n');
Hello World

Exercise 2:
15 * 3 + 4 - 10 / 2 - 7
37

Exercise 3:
15.0 * 3.0 + 4.0 - 10.0 / 2.0 - 7.0
37.

Exercise 4:
15.0e0 * 3.0e0 + 4.0e0 - 10.0e0 / 2.0e0 - 7.0e0
37.

Exercise 5:
15 * 3.0e0 + 4.0e0 - 10 / 2.0e0 - 7
37.

Exercise 6:
y = 15;
x = 3.0e0;
y * x + 4.0e0 - 10 / 2 - 7
37.

Connected to access.engr.oregonstate.edu  SSH2 - aes128-cbc - hmac-md5 - n  65x25  NUM
```

Milestone Report

Handwritten Answers to Milestone Questions:

Specification (what do you think the purpose of this milestone is)

Processing (how did you and/or your team go about solving the problem)

Testing Requirement (how did you and/or your team test for correctness)

Retrospective (what did you learn in this milestone)

Team Evaluation (what is the percentage of time contributed by each team member)

Milestone Grading

- Compiles, cleans, and produces stutest.out
 - 50%
- Testing: completeness of coverage
 - 25%
- Milestone report (done individually)
 - 25%
- Remember to demo within 7 days of the due date!!!

Quiz #1 Questions

- Form groups of 3 - 4.
- Think about string representation.
- What are the different choices? (Examples)
- What representation does gforth use?
- What is the tradeoff between these choices?