Scripting Language Design & Implementation

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Today

- Brief introduction
- Course guidelines
- Starting with Unix

Employ

Design

Create

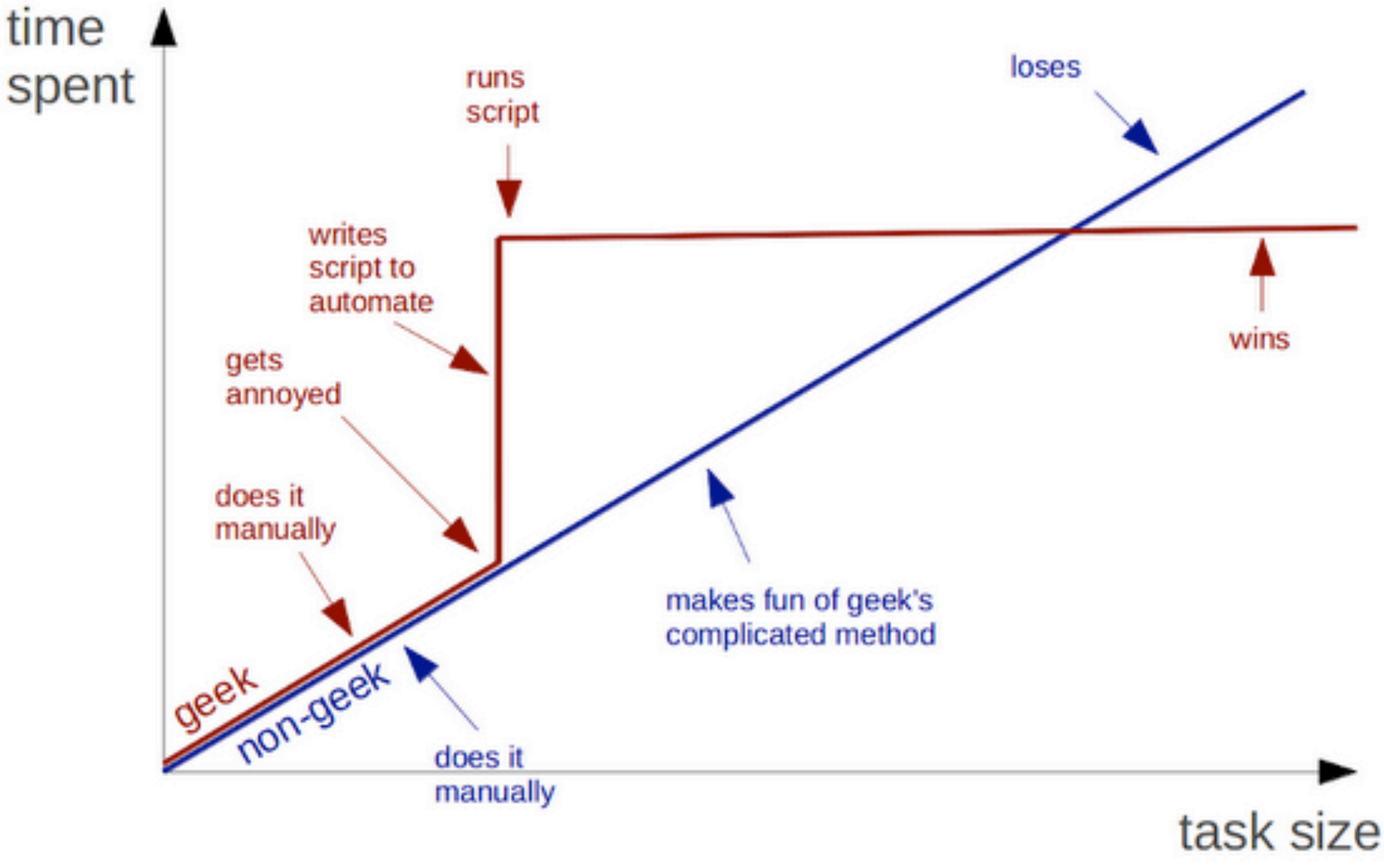
But, why?

My

$50,000

bash script.

Geeks and repetitive tasks



saltlakecity.startupweekend.org

Feb 2 - 4


AT&T
7:09 PM
Add New Event
Refresh
May 8, 2010
2:10pm
ACTH (mL)
0.56
1:40pm
Ketovolve (mL)
200.00
1:21pm
ACTH (mL)
0.56
May 7, 2010
10:38pm
Ketovolve (mL)
0.00
10:13pm
Ketovolve (mL)
1.00
9:39pm
Myoclonus
1.00

Scripting is ubiquitous.

Bad languages are too.

Learn to do it right!

Understanding

Implementing

What's a scripting language?

“I can’t define it, but I know it when I see it.”

C#

Fortran

Java

PHP

C++

OCaml

Python

Perl

JavaScript

Ruby

C

Fortran

C++

C

OCaml

C#

Java

JavaScript

Python

Ruby

PHP

Perl

Compiled

Interpreted

Typed

Untyped

Plug-in

Script

What about Lisp?

What do they do?

Automation

Extension

Conversion

Prototyping

Analysis

Untyped & Interpreted

Course material

- bash
- sed, awk
- make
- regex
- elisp, vimscript
- Perl, Python, PHP
- HTML5, CSS, JS
- Racket, Clojure
- Lua, Ruby
- R, SQL

- shell scripting
- web scripting
- databases
- data transformation
- processing/automation
- data analysis

Unix

Design

Design influences implementation.

Implementation influences design.

- whitespace
- comments
- syntax
- types
- scope
- interpretation style
- eval
- implicit conversion
- serialization
- macros
- closures
- objects
- classes
- arrays, hashmaps
- sets
- first-class control

Implementation

- regular languages
- finite automata
- context-free languages
- recursive descent
- parsing with derivatives
- abstract syntax trees
- desugaring
- normalization
- continuations
- continuation-passing
- tree transformation
- reduction
- denotational interpreters
- big step interpreters
- small step interpreters
- CEK machines

Final

Project

Small language. Very real features.

- lexical scope
- lambda/closures
- exceptions
- continuations
- side effects
- objects

Course guidelines

Textbooks?

$1,000

Google

&

RTFM

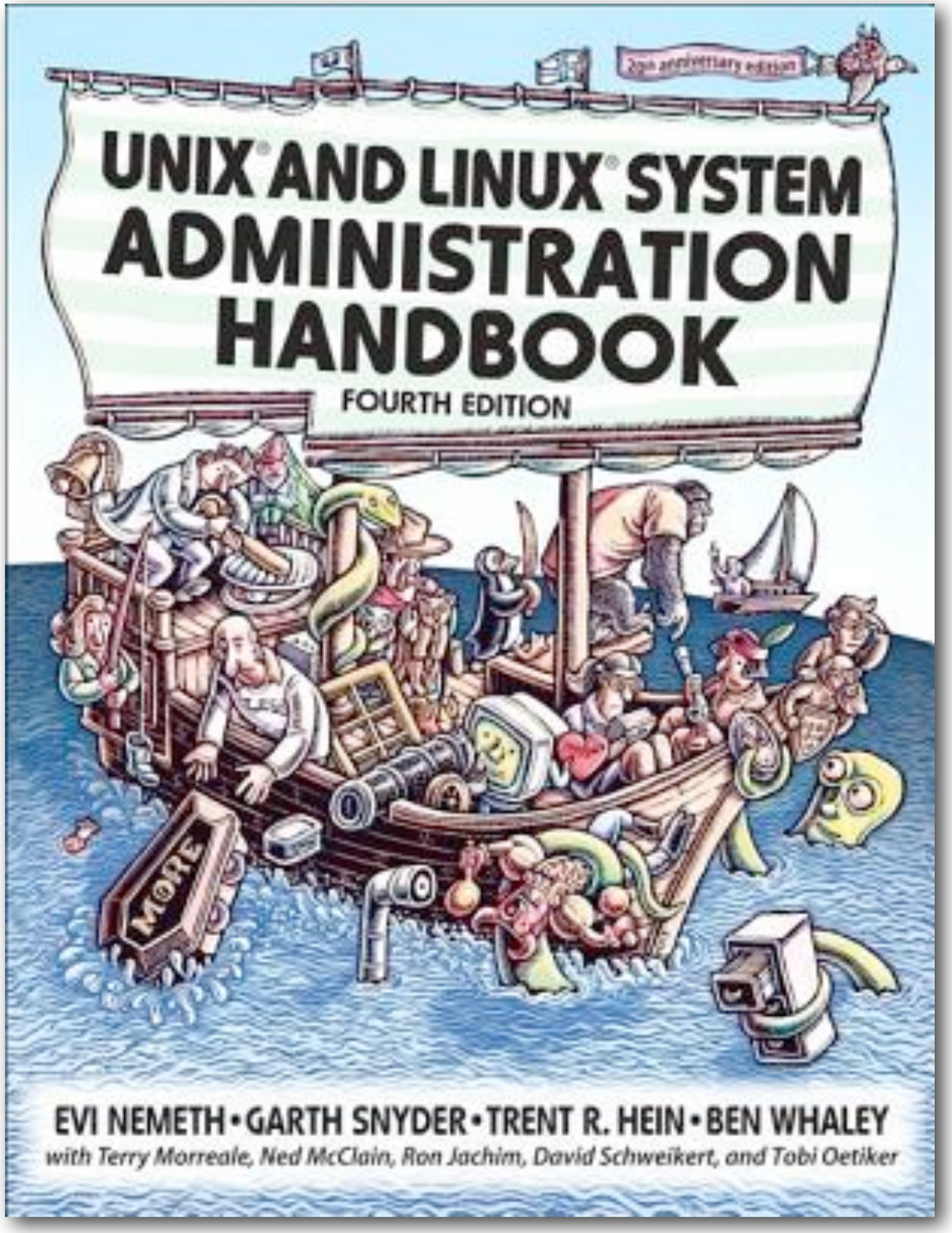
The Pragmatic Programmers

Seven Languages in Seven Weeks

A Pragmatic Guide to Learning Programming Languages

Bruce A. Tate

Edited by Jacquelyn Carter


20th anniversary edition
UNIX® AND LINUX® SYSTEM
ADMINISTRATION
HANDBOOK
FOURTH EDITION
MORE
EVI NEMETH • GARTH SNYDER • TRENT R. HEIN • BEN WHALEY
with Terry Morreale, Ned McClain, Ron Jachim, David Schweikert, and Tobi Oetiker

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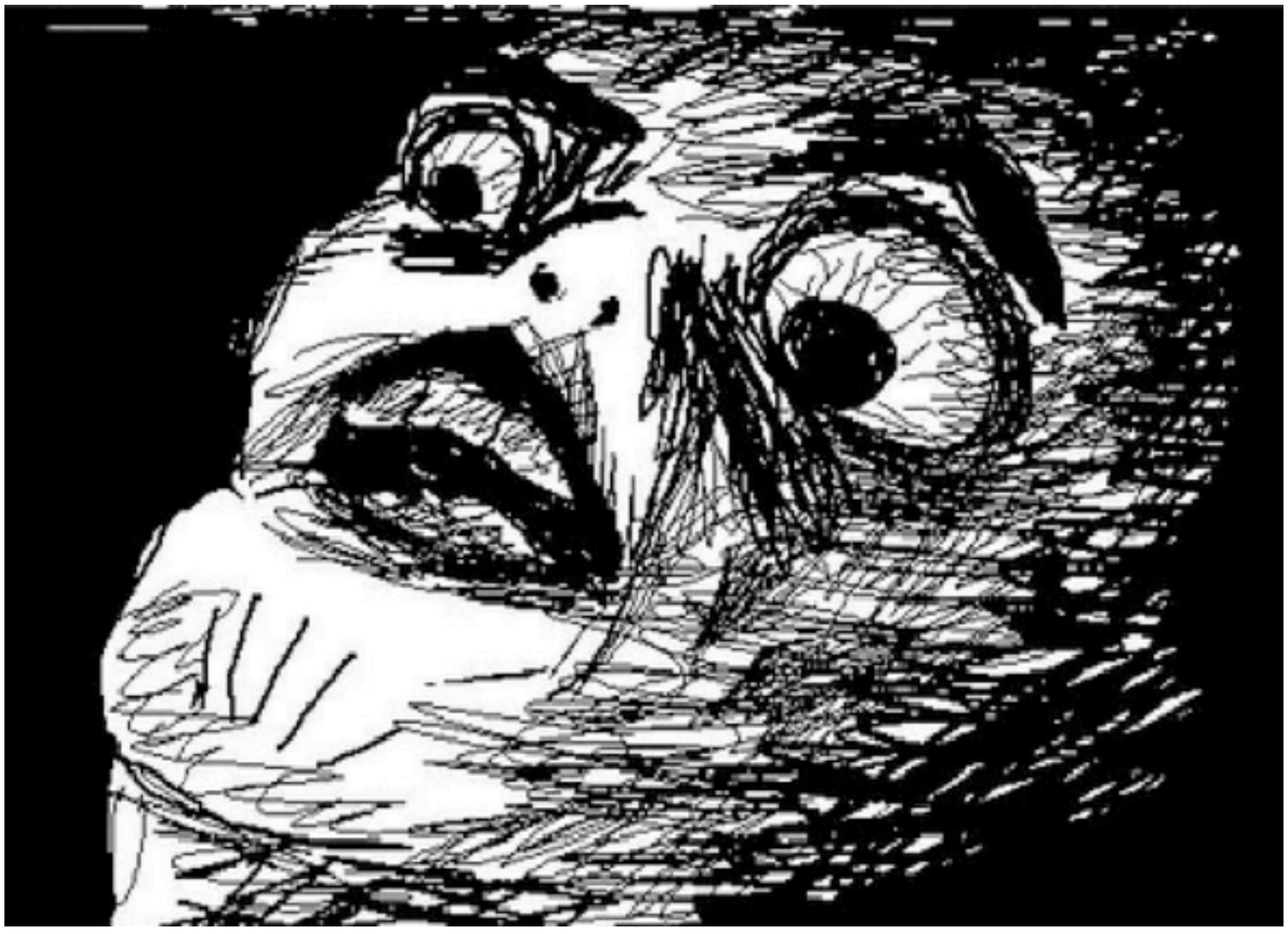
Difficulty

I want you to get an A.

But, this class is hard.

6 weeks later...

He wasn't kidding.



We are all going to die.

Hard but not cruel.

Optimizing knowledge/$.

No cheating.

Ask for help!

Standard bonuses

- Parallelize: Multiply grade by speedup
- Wikipedia: Up to +10% on final grade
- Exploit security vulnerability in my code

Grading

- 100% from exams
- 100% from projects

“...the moment of truth is a running program; all else is prophecy.”

Herbert Simon

Projects

- Unix scripting (10%)
- Text analysis (10%)
- Web scripting (10%)
- Parsing project (10%)
- Network project (10%)
- Final project (50%)

Starting Unix

What is Unix?

An operating ecosystem.

Linguistic abstraction & composition.

How to get Unix?

Buy a Mac.

$40-$80 at surplus.

Shell access.

Virtualize.

Dual boot.

Linode.

Homework

- Learn some Unix!
- Learn some bash!

Questions?