



HPCS

HPCS Study Overview

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Dr. Jeff Carver



Mississippi State University  University of Maryland 

Slide 1
HPCS Productivity

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Overview

- We are conducting a study during this class:
 - Done in conjunction with the larger HPC community
 - Similar studies occurring at different universities around the country
- Goals of the study
 - Understanding how people solve HPC problems and where they spend their time
 - Understanding tradeoffs among different variables (language, development approach, performance, etc...)
 - Allowing the next generation of high performance computers to take development effort into account



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Overview

- Independent Research Team
 - Dr. Carver from MSU
 - Dr. Basili, Dr. Zelkowitz, Dr. Asgari, Dr. Shull, L. Hochstein from University of Maryland
- Different types of data will be collected for this project
 - Background Survey
 - Effort/Activities during development
 - Defect logs
 - Questionnaire/Interview after assignments

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Defect log

- As you work on the problem, keep a log of your defects (bugs)
- We will provide a standard form
- Each time you fix a bug, please record:
 - **Description**
What was wrong in the code
 - **Reason**
Why you think you made the bug
 - **Symptom**
What happened that led you to believe there was a problem with your code
 - **Time to fix**
How long it took from the time you realized there was a bug until the time you fixed it
- Please **DO NOT** record compile-time errors on this log

Dr. Luke will not see this data until after the semester and it will not affect your grade

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Example defect log

CSE 4163/6163		Description: What was the specific problem in the code?		
Defect log form		Reason: Why did the bug occur in the first place?		
Name: Jeff Carver		Symptom: How did you know there was a problem with the code?		
		Time to fix: How long did it take you to find and fix the bug?		
Date	Description	Reason	Symptom	Time to fix (minutes)
10/25	Used "f" instead of "j" in nested for-loop	Simple typo (typed wrong letter)	incorrect output	75
10/26	Divide-by-zero error	didn't think variable would ever be zero so didn't check for the condition	program crashed	15
10/26	Used wrong variable in a calculation	copy-pasted code from another section, didn't modify pasted code properly	incorrect output	40
10/27	incorrectly put statement inside loop	carelessness (no specific reason)	program hung (never stopped running)	60

This example and a blank log file will be available on the class web page

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Effort collection

- Instrumented compiler
- Instrumented job scheduler
- Instrumented editor
- Instrumented shell

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Environment instrumentation

- Editors on titan will have plugins that track the amount of time you spend editing files
- Supported editors:
 - Emacs (preferred)
 - Vim
- To improve quality of data collection
 - Please try to do as much development as possible on the remote machine (titan), including serial development if possible
 - Please use one of the supported editors
- Your shell will be instrumented as well
- These mechanisms are automatic: hopefully, you won't even notice them

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Environment Instrumentation

- In order for the data collection procedures to work properly you must perform the following steps:
 - Execute a script to set up the instrumentation:
 - If you are using a class account run:


```
/home/lorin/inst/sensors/setup_tcsh.sh
```
 - If you are using a non-class account run:


```
/home/lorin/inst/sensors/setup_bash.sh
```
 - Logout and the log back in before starting work
 - NOTE: You only have to run the script one time – not each time you log in

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Reasons to participate

- Help advance the field of software engineering for high performance computing
- Learn how much time you really spend debugging
- Raffle for USB memory stick!

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Forms For Today

- Consent form
 - Allows the research team to use the data collected during this study (anonymously)
- Background Survey
 - Allows the research team to better understand the types of experience and knowledge you have at the beginning of the class
 - Please be as honest and accurate as possible
- Tribal lore survey
 - Survey of opinions about parallel computing

Your professors **will not** see this data until after the semester and it **will not** affect your grade

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Questions?

Please email me with any questions or problems

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