

18-447

Computer Architecture
Final Review Session

Prof. Onur Mutlu

Carnegie Mellon University

Spring 2015, 5/1/2015

Lab 6 Extra Credit

- 2.5% Ashish Shrestha (ashresth)
- 2.5% Amanda Marano (amarano)
- 2.5% Pete Ehrett (wpe)
- 2.0% Jared Choi (jaewonch)
- 2.0% Akshai Subramanian (avsubram)
- 2.0% Sohil Shah (sohils)
- 2.0% Raghav Gupta (raghavg)
- 1.5% Kais Kudrolli (kkudroll)

Course Evaluations (due May 11)

- Due May 11, 11:59pm
- Please do not forget to fill out the course evaluations
 - <http://www.cmu.edu/hub/fce/>
- Your feedback is very important

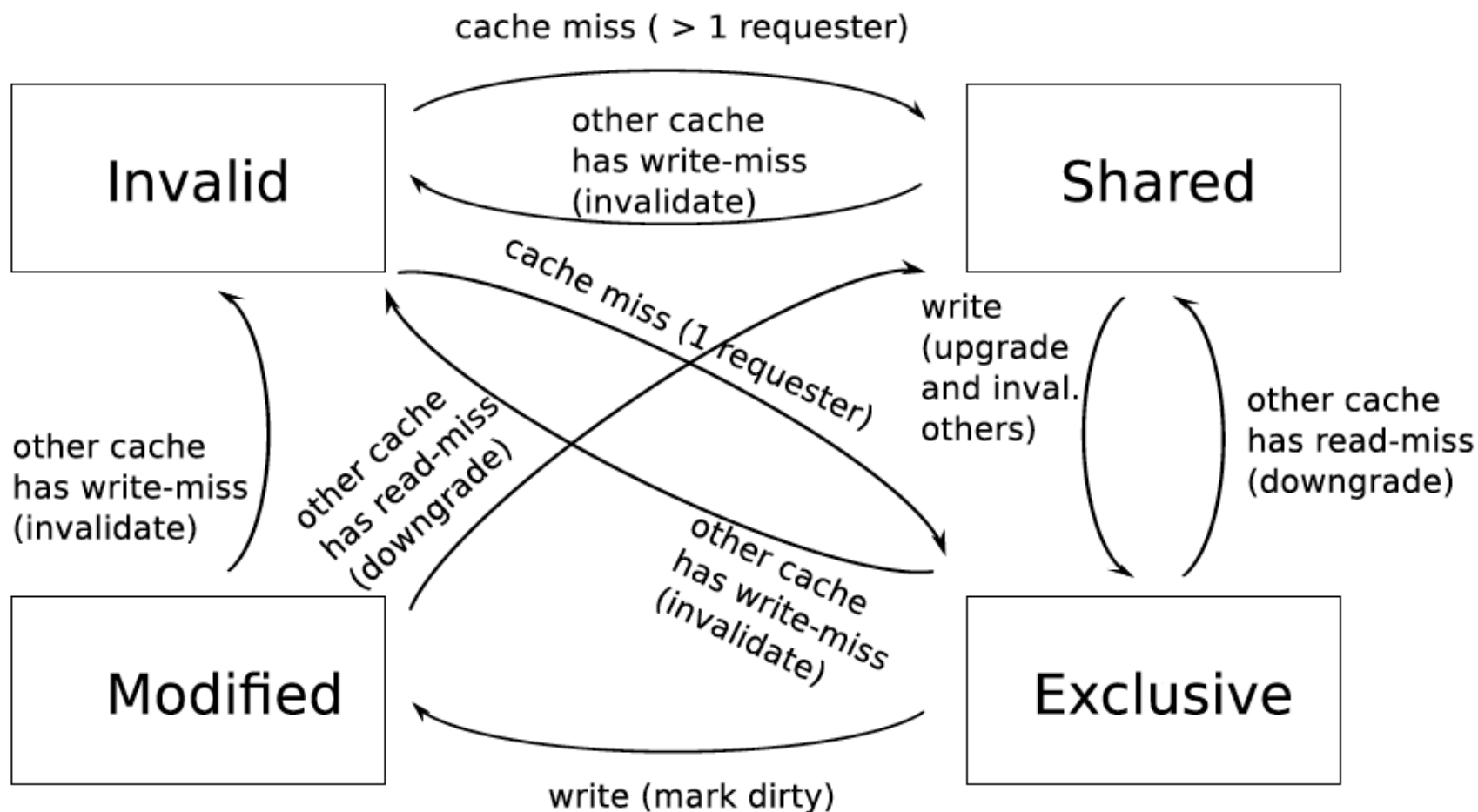
- I read these very carefully, and take into account every piece of feedback
 - And, improve the course for the future
- Please take the time to write out feedback
 - State the things you liked, topics you enjoyed, what you think the course contributed to your learning, what we can improve on
 - Please don't just say "the course is hard and fast paced"
 - Because you knew that from the very beginning!

Extra Credit for Course Evaluations

- 0.25% extra credit for everyone in the class if more than 90% (i.e., 25) of you fill out the evaluations

Extra Credit Lab 8: Multi-Core Cache Coherence

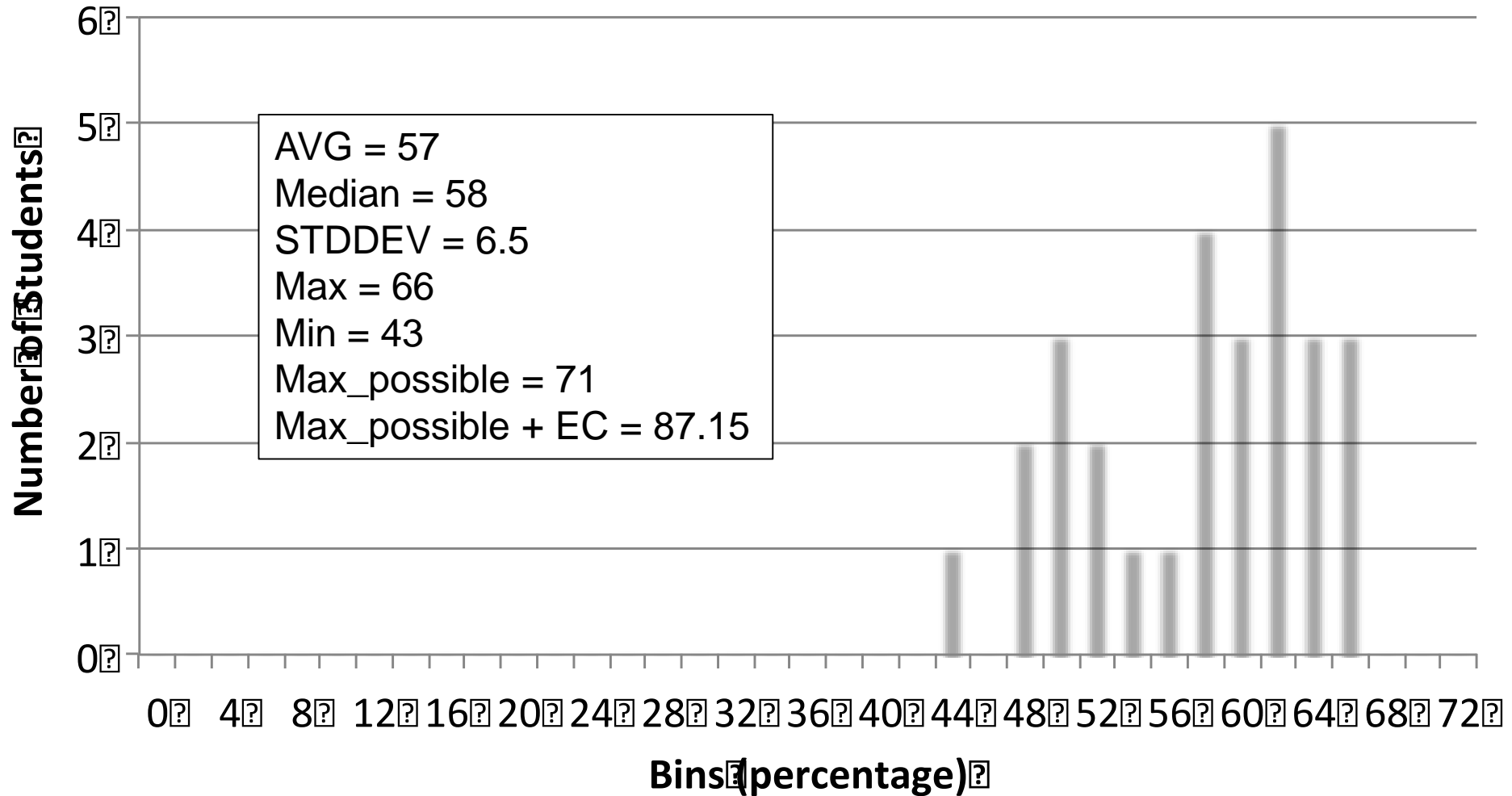
- Completely extra credit (all get 5% for free; can get 5% more)
- Last submission accepted on May 10, 11:59pm; no late submissions
- Cycle-level modeling of the MESI cache coherence protocol



Final Exam: May 5

- May 5, 5:30-8:30pm, Location: BH A51
- Comprehensive (over **all topics** in course)
- Three cheat sheets allowed
- We will (likely) have a review session on Friday
- Remember this is 22% of your grade
 - I will take into account your improvement over the course
 - Know all concepts, especially the previous midterm concepts
 - Same advice as before for Midterms I and II

Course Grades So Far



A Note on 740, Research, Jobs/Internships

- I am teaching **740** next semester (Fall 2015)
 - Lectures M, W 7:30-9:20pm
 - Recitations T 7:30-9:20pm

- If you are enjoying 447 and are doing well, you can take it
→ feel free to talk with me

- If you are excited about Computer Architecture research or looking for a job/internship in this area
→ talk with me

More on 740

- 740 is the next course in sequence
- Time: Lect. MW 7:30-9:20pm, Rect. T 7:30-9:20pm
- Content:
 - Lectures: More advanced, with a different perspective
 - Recitations: Delving deeper into papers, advanced topics
 - **Readings**: Many fundamental and research readings; will do many reviews
 - **Project**: More open ended research project. Proposal → milestones → final poster and presentation
 - Done in groups of 1-3
 - Focus of the course is the project and critical reviews of readings
 - Exams: lighter and fewer
 - Homeworks: None

Lecture Schedule (Second Half)

- The memory hierarchy
- Caches, caches, more caches
- Virtualizing the memory hierarchy: Virtual Memory
- Main memory: DRAM
- Main memory control, scheduling
- Memory latency tolerance techniques
- Non-volatile memory

- Multiprocessors
- Coherence and consistency
- In-memory computation and predictable performance
- Multi-core issues (e.g., heterogeneous multi-core)
- Interconnection networks

Lecture Schedule (First Half)

- Fundamentals, ISA, ISA Tradeoffs
- Single-cycle Microarchitectures
- Multi-cycle and Microprogrammed Microarchitectures
- Pipelining
- Issues in Pipelining: Control & Data Dependence Handling, State Maintenance and Recovery, ...
- Out-of-Order Execution
- Issues in OoO Execution: Load-Store Handling, ...
- Alternative Approaches to Instruction Level Parallelism