Methodologies and Tools for Computer Architecture Research

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MO801

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Goal

- This course will cover tools and methodologies for Computer Architecture research
- Including:
  - Modern simulators
  - Benchmarks for single/multi-cores and clusters
- Recent papers on the area and how they model:
  - Pipelines
  - Caches
  - Execution engines
  - Power evaluation

Bibliography

- Processor Microarchitecture: An Implementation Perspective.
  - Antonio González, Fernando Latorre and Grigorios Magklis
  - Synthesis Lectures on Computer Architecture.
  - Morgan && Claypool Publishers.
- Recent papers and presentations in the area

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Grading

- Written exam
  - 40% of final grade
- Projects
  - 60% of final grade
  - One per month covering different tools
- *Any unethical behavior related to the evaluation process will result in failing the course with the lowest possible grade.*
- *Every assignment is an individual assignment unless otherwise mentioned.*
- *Students are not expected to talk to each other about solutions to the assignments unless otherwise mentioned.*

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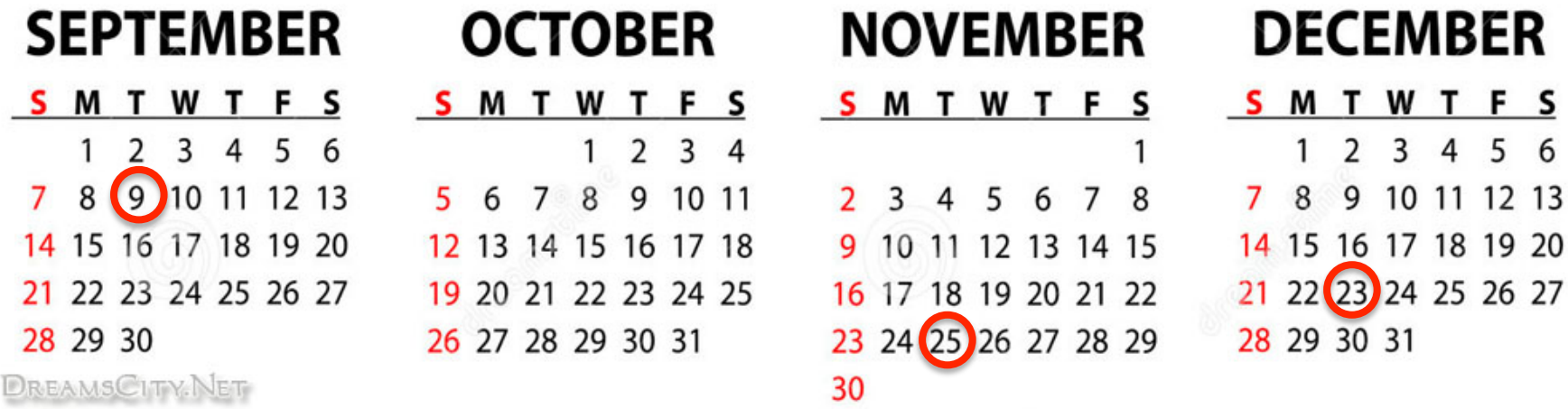
Calendar



SEPTEMBER

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

OCTOBER

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19	20	21	22	23	24	25
26	27	28	29	30	31	

NOVEMBER

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DECEMBER

S	M	T	W	T	F	S
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28	29	30	31			

BenchmarkS

- CloudSuite
- CSiBE – Code Size
- DaCapo
- HPCC
- Mantevo
- MediaBench
- MiBench
- MineBench
- NAS NPB
- NAS OMP
- Parsec
- Rodinia
- San Diego Vision Benchmark Suite
- Single source benchmark
- SPEC
- SpecJBB
- SpecJVM
- SPECWeb
- Streamit
- Sysbench
- TPC

Tools

- ArchC
- Cacti
- Eztrace
- FabScalar
- Gem5
- gprof
- Leon
- MARSSx86
- Mcpat
- PAPI Performance Monitoring Tool
- perf
- Pin
- Plasma
- Qemu
- Running Average Power Limits (RAPL)
- Sesc
- Simpoint

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First Project

- Count the number of instructions in each SPEC 2006 benchmark programs execution
- Tools required:
  - PIN
  - SPEC
- Questions:
  - Is there any variation?
  - How long should it take?
  - How long did it take?
- Do something else with this infrastructure
  - Show me that you have learned how to use PIN (create a pintool)
- Oral presentation at October 2nd.

Lets Work!

- Pick one of the papers in my table
- Write down (separate paper) the infrastructure the authors used
  - Tools
  - Benchmarks
  - Methodology
- Repeat for another paper
- Check your results with your colleagues