

{Princess Sophia Bananahammock and Friends

Genevieve LaBelle

Alex Hinz

Daniel Rasinski

What work you plan to do

Basic Design (65 points total)

- Basic 5 stage pipeline with full instruction set & data forwarding - (45 pts)
- Pipeline with Cache integration (memory stalling) – (5 pts)
- Split L1 Caches (I-cache & D-cache) - (5 pts)
- L1 cache request arbiter – (5 pts)
- Unified L2 Cache - (5 pts)

Advanced Design Options (55 more points)

- Branch prediction? (35 pts total)
 - BTB (10 pts)
 - Support for unconditional branches and JSR in BTB – (5 pts)
 - Support for TRAP, JSRR, and JMP in BTB – (5 pts)
 - Local BHT (10 pts)
 - Branch Prediction within BTB – 5 points
- Performance counter (5 pts)
 - L1I, L1D, L2 cache miss rate (1 pt each)
 - 1 point for branch mispredict rate (1 pt)
 - 1 point for bubble insertion rate (1 pt)
- Things with cache (15 pts total)
 - 8-way set associative cache (10 pts)
 - 8-way with pseudo LRU cache (5 pts)

What work you might do if you have time (extra credit)

- Cache-line Eviction Write Buffer - (8 pts)
- Memory Stage Leapfrogging - (15 pts)
- More advanced features of branch prediction
- LC3b-X support? (10 pts)

How you expect to earn 40 design points / team member

As outlined in what we plan to do, on top of the 65 basic design points, we'll implement 55+ points worth of Advanced Design options. We expect that the specific features we decide to implement will change as we get to know the design better and do more research. We may attempt some extra credit after completing the requirements in case any of our implementations get partial credit so that we can still get 40 points each.

Detail work breakdown between members

We will work on the basic pipeline structure together so we are all very familiar with the architecture. Dan will do the primary work on the pipeline and write comprehensive tests. Alex will work on branch prediction. Genevieve will work on the 8-way cache. Alex and Genevieve will also write some tests. We may switch things up once we see how much work is needed.