CSE138 Lecture 19

this time:
- announcements/logistics
- ask me anything

- by midnight next Tues. 19th please fill out the peer assessements!

- Monday 4pm final!

- zine project - let me know if you might be interested in doing this over the summer.

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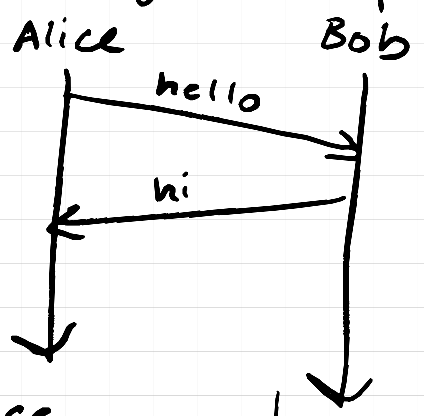
what's my research?

- one topic: Choreographic progamming

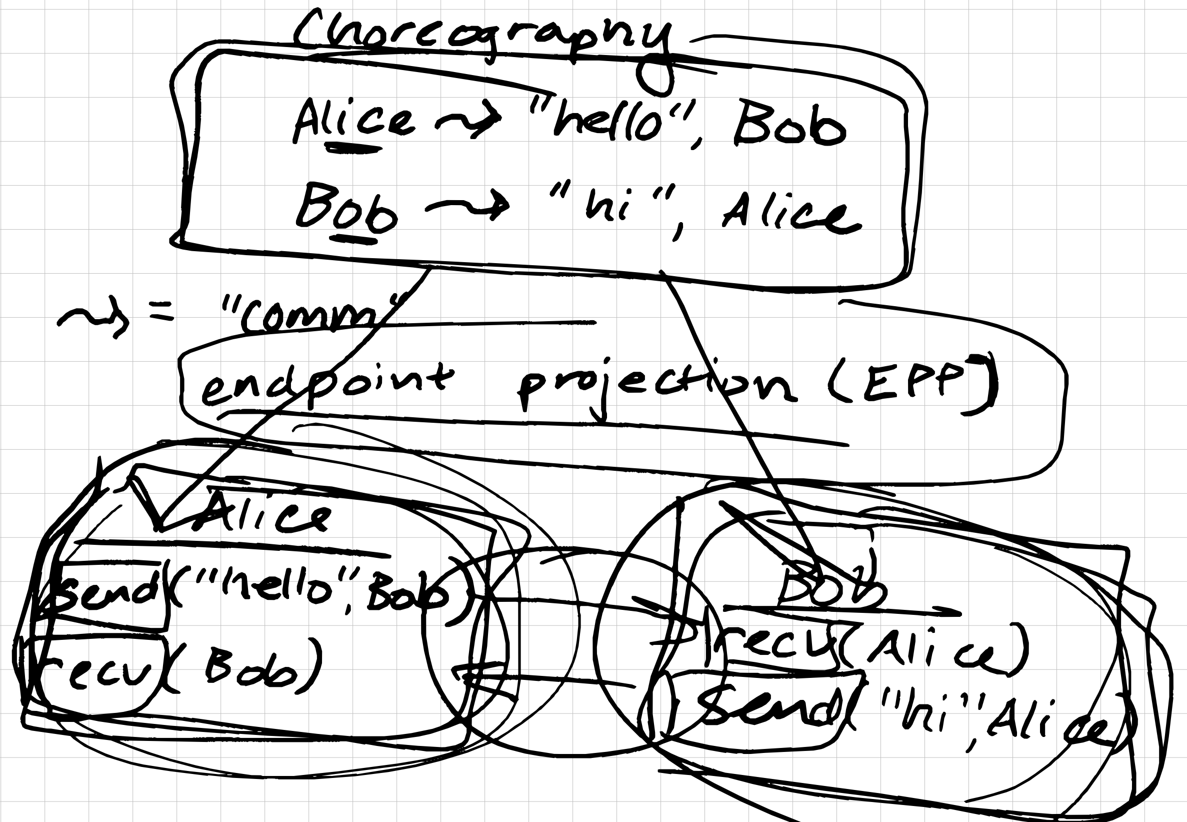


Alice

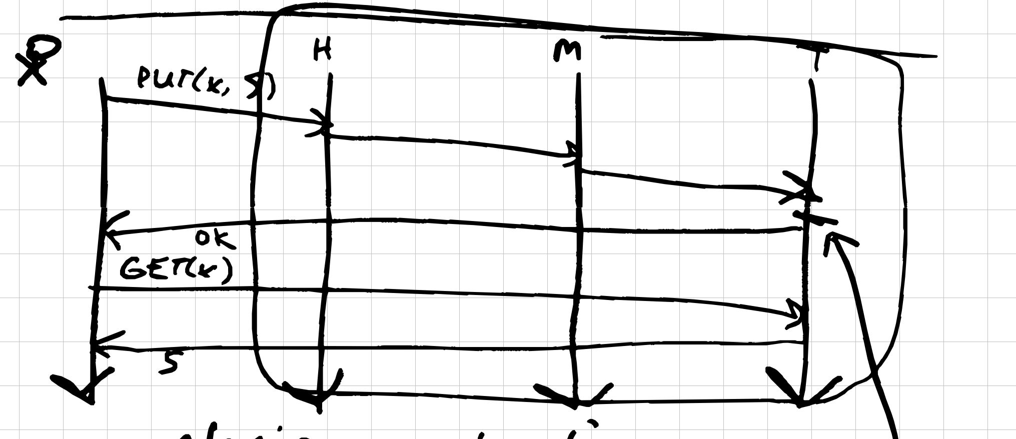
~~send("hello", Bob)~~
recv(Bob)

Bob

→ recv(Alice)
send("hi", Alice)

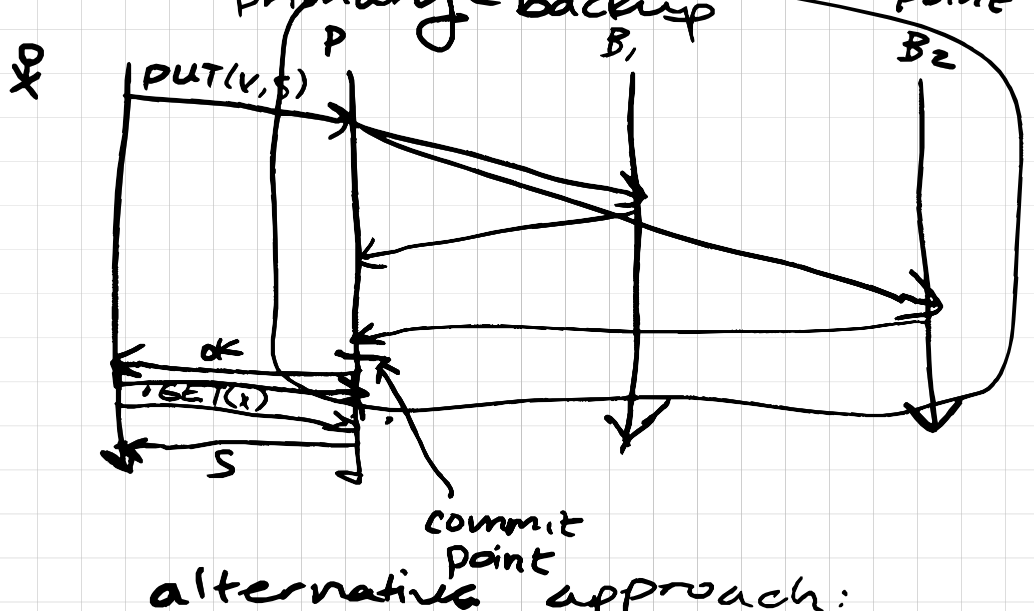


Chor (2013)
Choral (2020) ← choral-lang.org
Pirouette
our idea: library-level CP

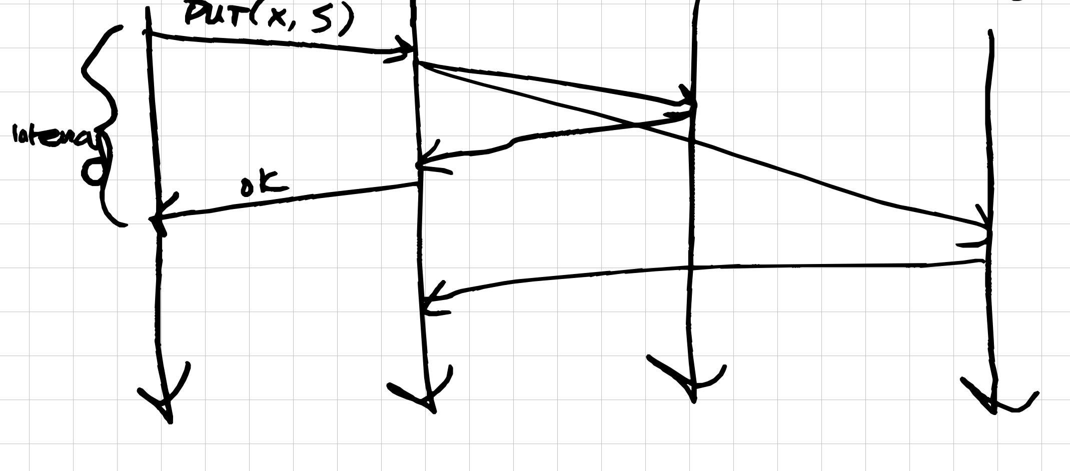


chain replication

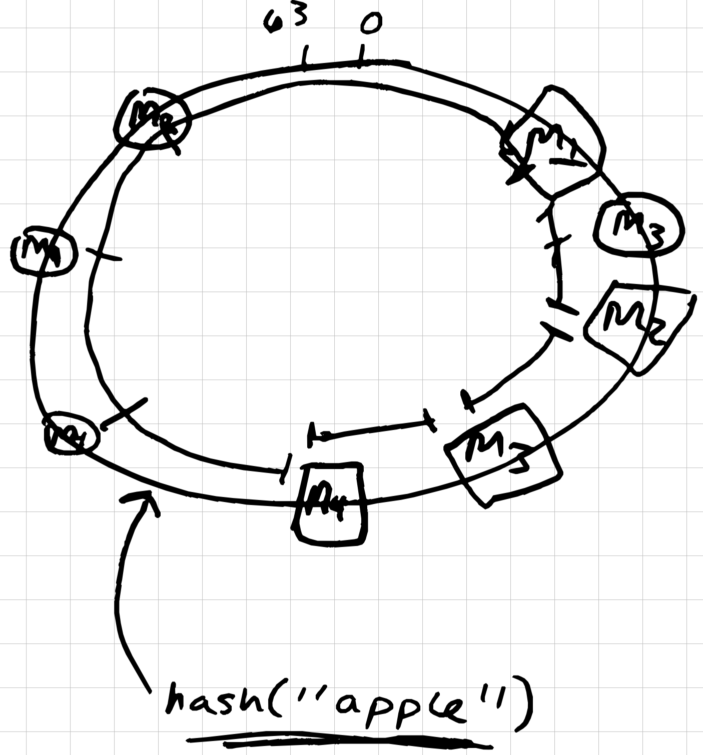
primary-backup



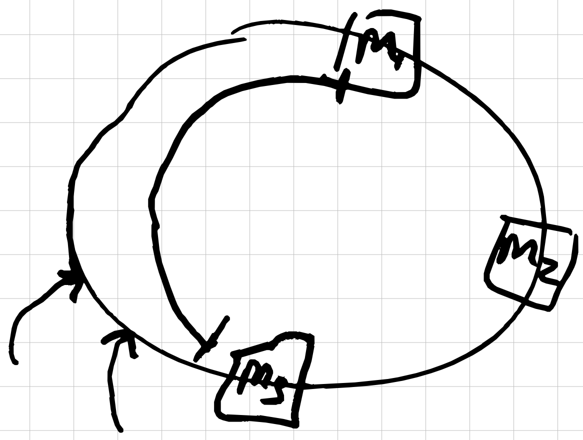
alternative approach:

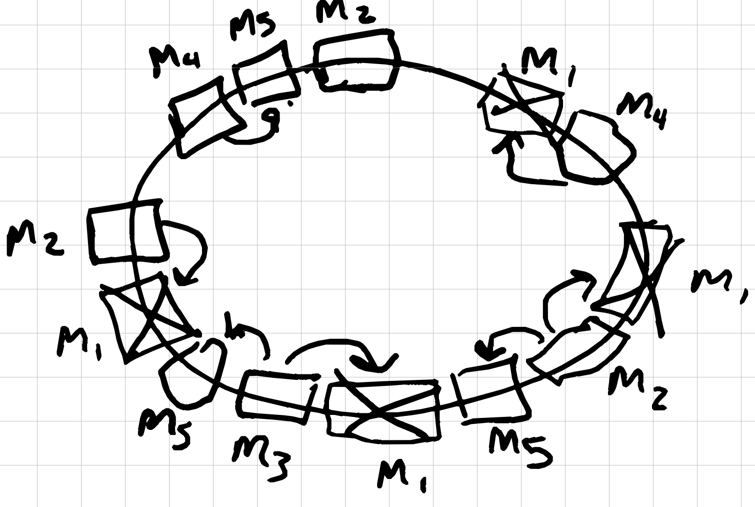


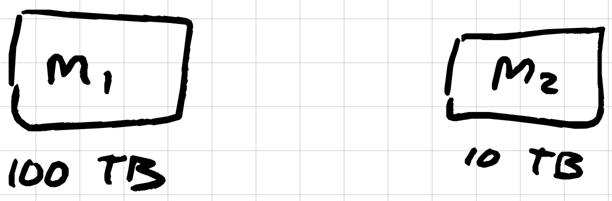
virtual nodes



Riak ← open-source Dynamo clone!







10 vnodes   2 vnodes

offline systems vs. online systems

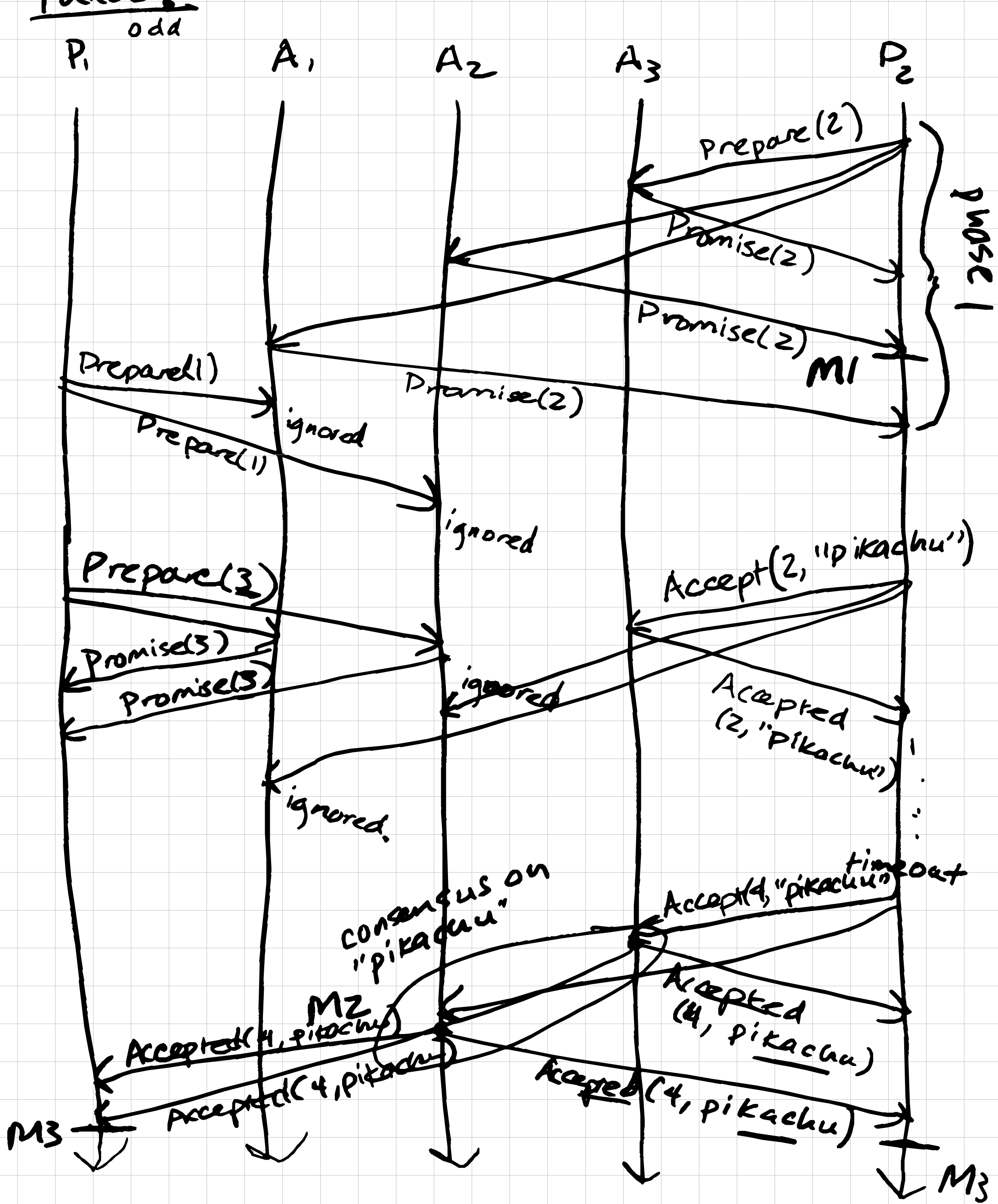
MapReduce

compilers ⟷ incremental compilers?
JITs?
REPLs?

streaming data processing

↗ Jamie Brandon blog post

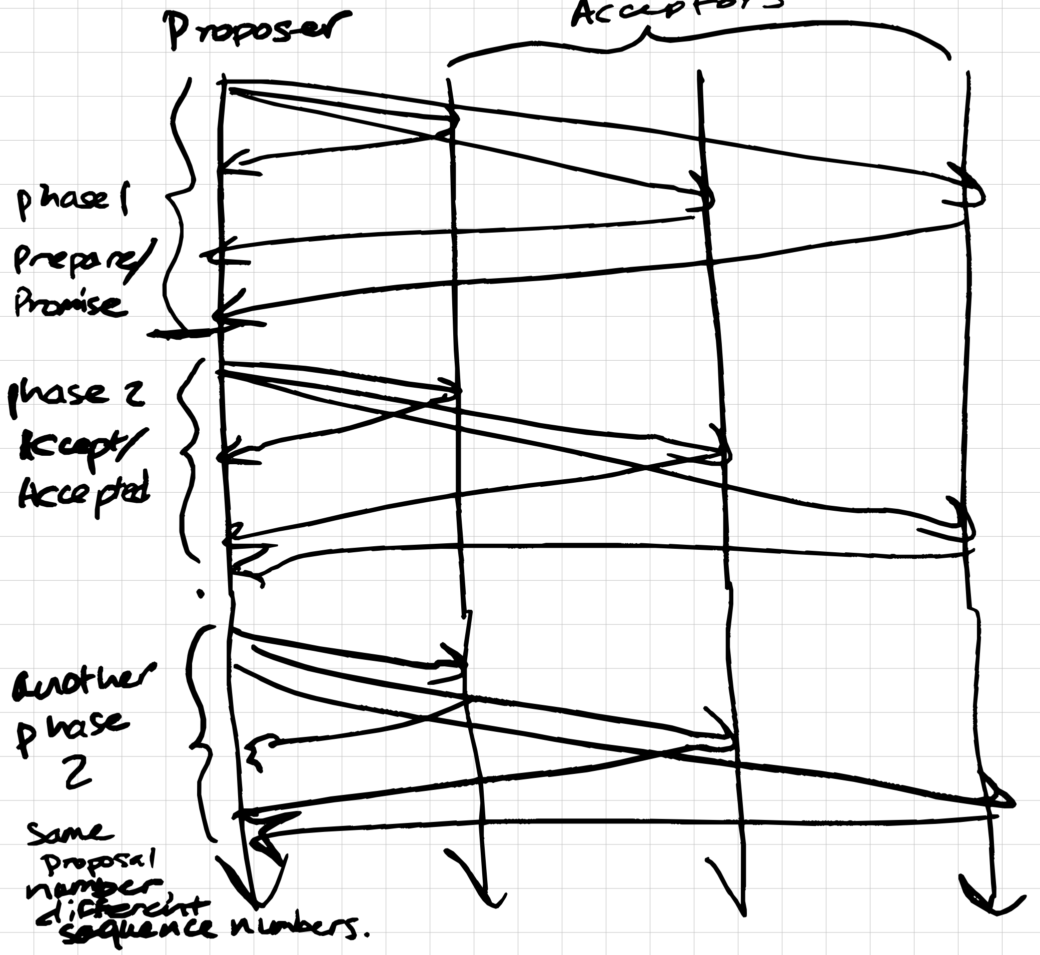
Paxos!



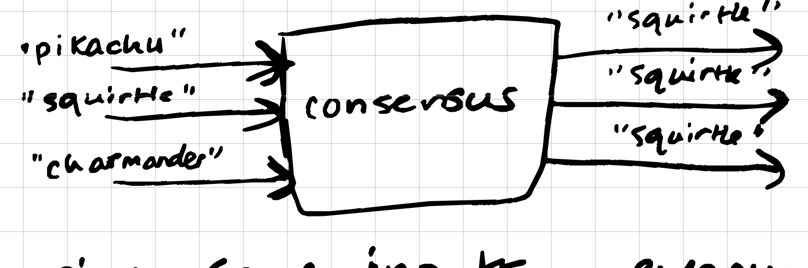
milestone 1 – a proposer gets a majority of acceptors "on board" with it (a proposer gets Promise(n) messages for a certain n from a majority of acceptors)

milestone 2 – consensus is reached (a majority of proposers send Accepted messages for a particular value e.g. "pikachu")

milestone 3 – participants learn that consensus is reached by receiving Accepted messages ~~for~~ a particular value from a majority of acceptors.



multi-Paxos: keep doing Phase 2 for as long as you can (unless another proposer takes away your "leadership")



given some inputs, everyone must produce an output that respects these criteria:

- termination:
  - everyone eventually produces an output.
- agreement:
  - everyone who produces an output produces the same output.
- validity:
  - every output produced must be something that was proposed.

FLP result says this is impossible in the async network model and the crash fault model. ¨̯

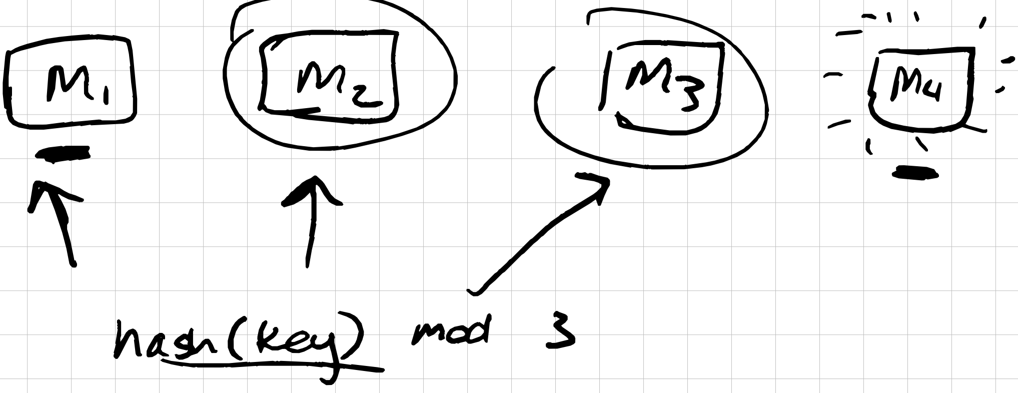
CAP theorem:

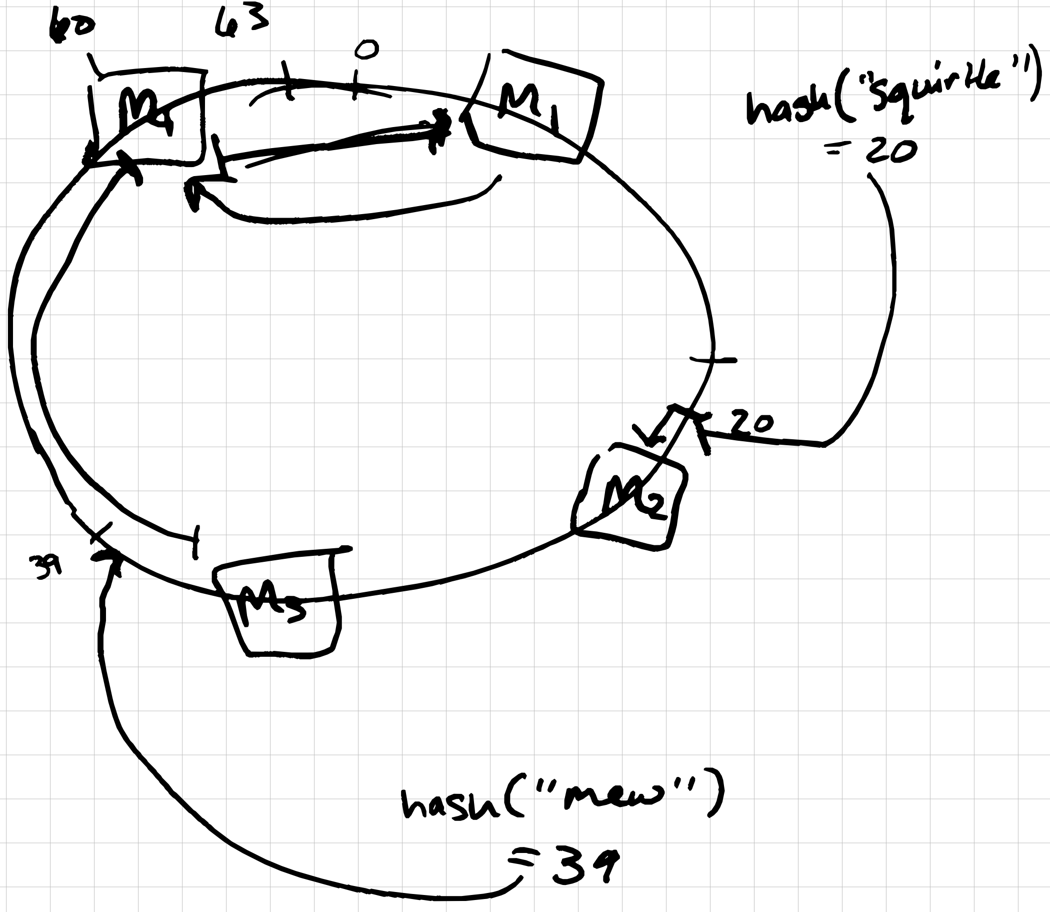
Consistency (safety)
Availability (liveness)
Partition tolerance

} pick 2 of 3 (this is unrealistic)

"you can't sacrifice partition tolerance" ← a good blog post

prioritize whichever of safety or liveness is right for your use case!


M1
M2
M3
M4
hash(key) mod 3


60
63
0
M4
M1
hash("squirtle")
= 20
20
M2
39
M3
hash("mew")
= 39