CS744

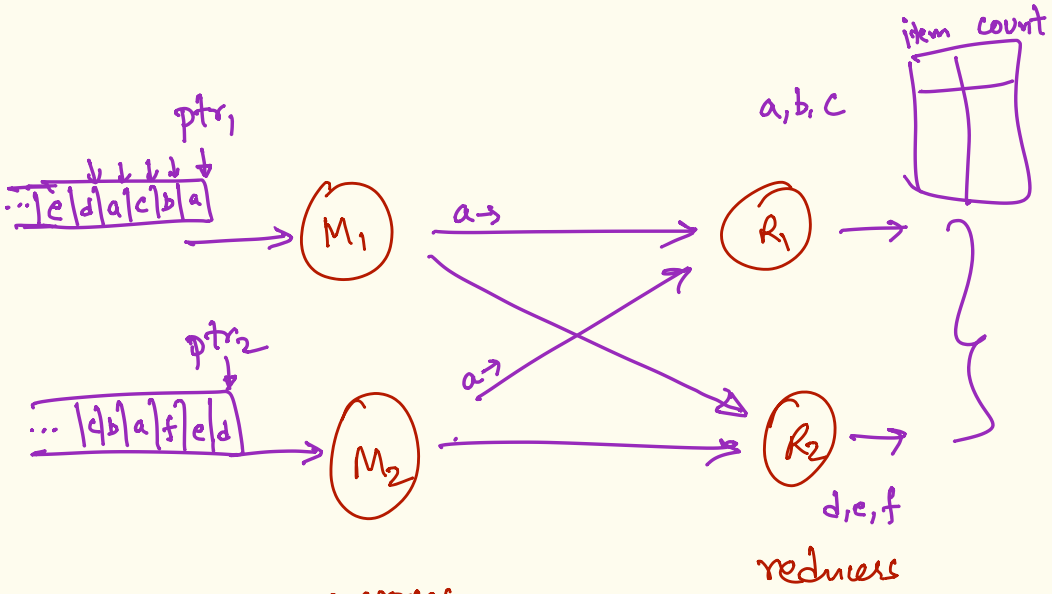
Lecture 24

Lab5 ~~ distributed systems (n/w programming)

- global consistency asynchronous distributed systems.

- Quiz 2
  2nd Nov. Mon.
  8am Lec. 24
- Lab Quiz 2
  6th Nov. Fri
  5pm n/w
  ⊛ pthreads & programming
- Endsem
  17th Nov. Tue
  6pm.

.



mappers

fwd ~~count~~ words/items

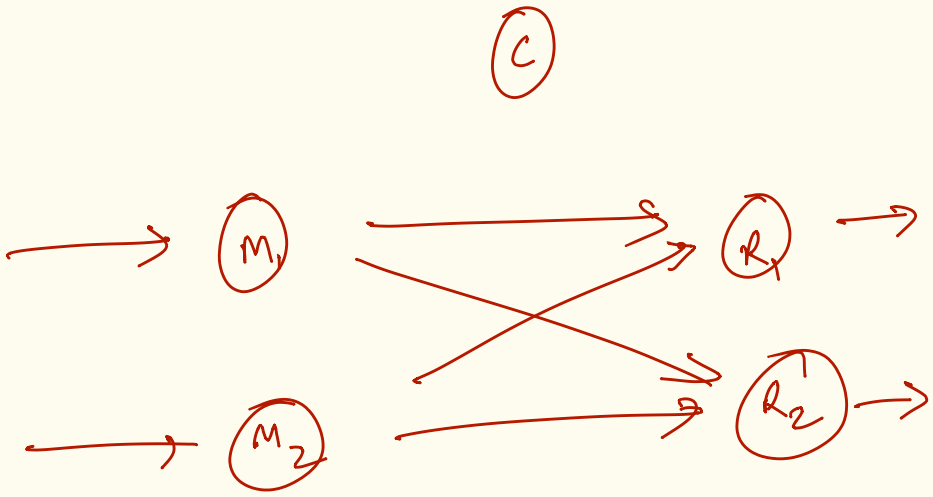
hash fn.

h(item) = i

fwd item to reducer i

⊛ Soln: Chandy-Lamport Global Consistency Solution.

- no n/w failures
- FIFO channel
- single-failures
- a co-ordinator
- co-ordinator does not fail.



Q. how to detect failures?

- periodic HEARTBEAT msg. from mappers & reducers.

(if) (no) msg from an entity ⇒ failure!

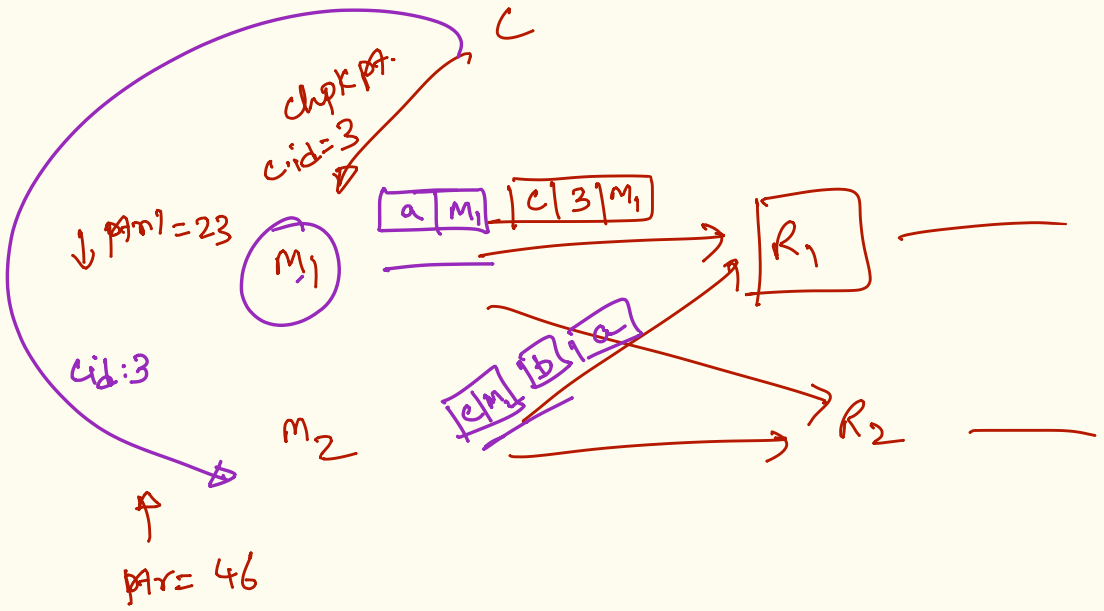
triggers recovery & the recovery protocol.

① co-ordinator — listens for heartbeat msgs.
— sends checkpoint msgs.
or — sends recovery msgs.

② mapper:
- read input, process input, fwd. to reducer
- on checkpoint msg (from co ord).
  - cid — chkpt. number
  - save ptr on input — <cid, ptr> to disk
  - send chkpt marker to all reducers.
  - send ckpt. ack to co-ord.

③ reducer:
- read input, process, increment count
- on chk pt. msg. from mapper j
  - * block/pause/ log new items to separate before & after the chk pt. marker
  - ① till chk.pts from all ~~mappers~~ mappers recvd. || checkpoint/save reducer state. <cid, wc table>
  - ② send a checkpoint ack to co-ord.

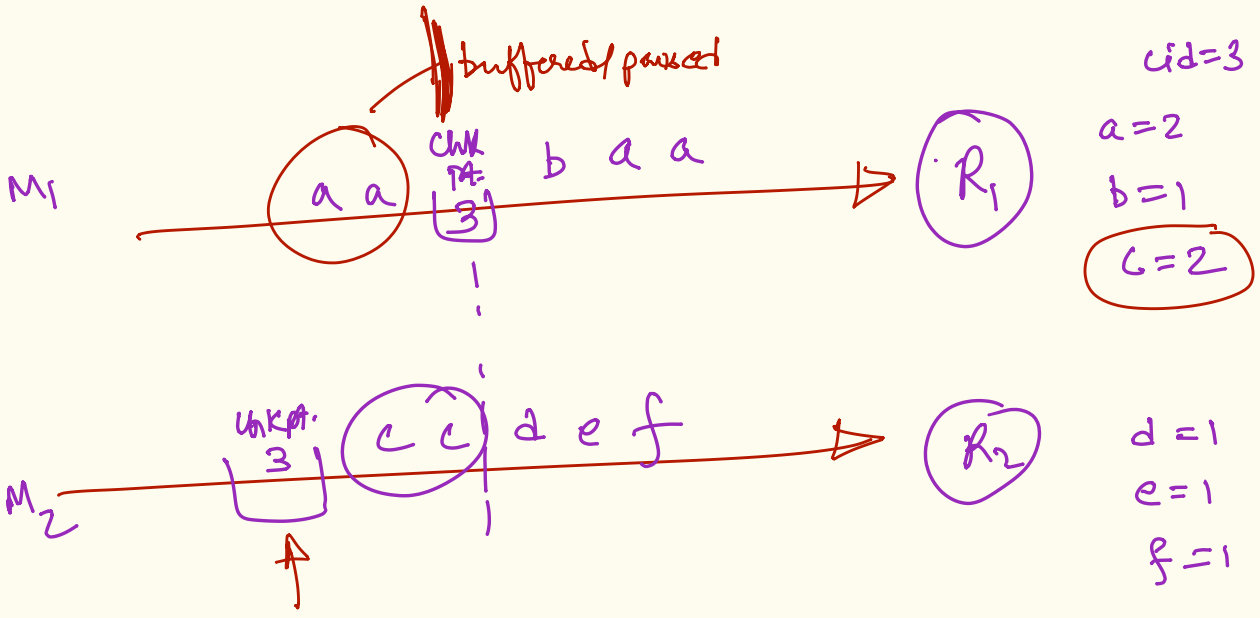
R1 from M1 c-id: 3



cid: 3, M_1: 23, M2: 46 : R_1 R_2

for. chkpt. msg from co-ords

chk pt. acks = # reducers + # mappers



Recovery

chk. pt. id, recovery id.

① Co-ord detects failure, restarts service
sends recovery msg. to all reducers

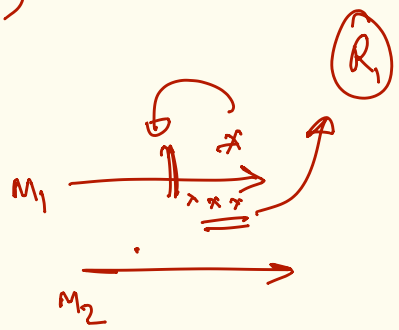
counter for # recoveries

- move/recover/reset state ~~to~~ ~~state~~ based on chk pt. id
  - resets the WC table to the saved version corresponding to chkpt. id

at reducer.

- send recovery ack to co.ord.

  if (rec.id > msg.rec.id) every every
  ignore mapper.



at mapper

- on recovery msg.
- reset ptr. to chk-id state
- reset recovery id to the one chkpt msg.
- & then process input & send msgs.

send ack to co.ord.

| msg.typ | data | recovery id |