Agenda:

1. Wrap-up: Quorum Replica Model
   - total ordering of events in D.S.

2. Journal F.S.

3. Log (Atomicity) - all-or-nothing
   - Write-ahead Logging (WAL)
   - 1st write to log - log entry
   - do the actual op.

4. before and after
   - strict serialization
   - execute transaction in order
   - of their i.d.
   - transaction i waits for transaction
     i-1 to complete
   - satisfies execution of concurrent
     trans. should be in some serial order
O. How to do more listening - Can't harden

The next lesson

The other program

You can't have a car

Go my given them

One writer is another

Writer another

- No

\[ a + b = N \]

\[ a + b > N \]

\[ \text{if} \]

\[ N = 5 \]
1. Each process broadcast its request.

2. Each process checks for exclusion.

3. Each process orders requests.

\[ A \rightarrow B \land B \rightarrow A \]

\[ L_C(A) \land L_C(B) \]

\[ \text{id} \]

A & B are concurrent.
1. I'm not sure if you mean to delete this document. I've saved it as is.

2. You may want to send this document along with your request. It has been sent and every precaution has been taken.
Diagram:

- **About**
- **Pendy**
- **Comma**
- **1 4 5 6**
- **Next Version**
- **Current Version**
- **History**
- **A: 0 1 2 3 4**

Diagram Details:
- **Read** Scan Background Fix First
- **Comma**
- **1 4 5 6**
- **2 0 5**
- **1 0 1**
- **Outlayer**
- **All or None**
- **Action**
- **Read**
- **Peek**
- Log (Atomic) - method to improve performance

- a single interleaved log is maintained on a separate disk; always appended.

<table>
<thead>
<tr>
<th>type: change</th>
<th>type: outcome</th>
<th>type:...</th>
</tr>
</thead>
<tbody>
<tr>
<td>actmid: 9979</td>
<td>actmid: 9979</td>
<td>status: committed</td>
</tr>
<tr>
<td>redo action:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>undo action:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

failure

recovery

old state

at committed

if need

roll back

PUT (debit=account, $90)

PUT (debit=account, $120)
Perform Log-Record, redo, acton.

If (log-record.type = change)
  log-record = next record
  log-until end,

- fs log-record
  log-record = previous record
- fs log-record

- minumns = NULL

procedure 

recovery procedure
Other configuration if losing db.

Support evil db.

1. Increase read performance - possibly
2. Internal read performance - read for