CD

01

Relatório Projeto Final

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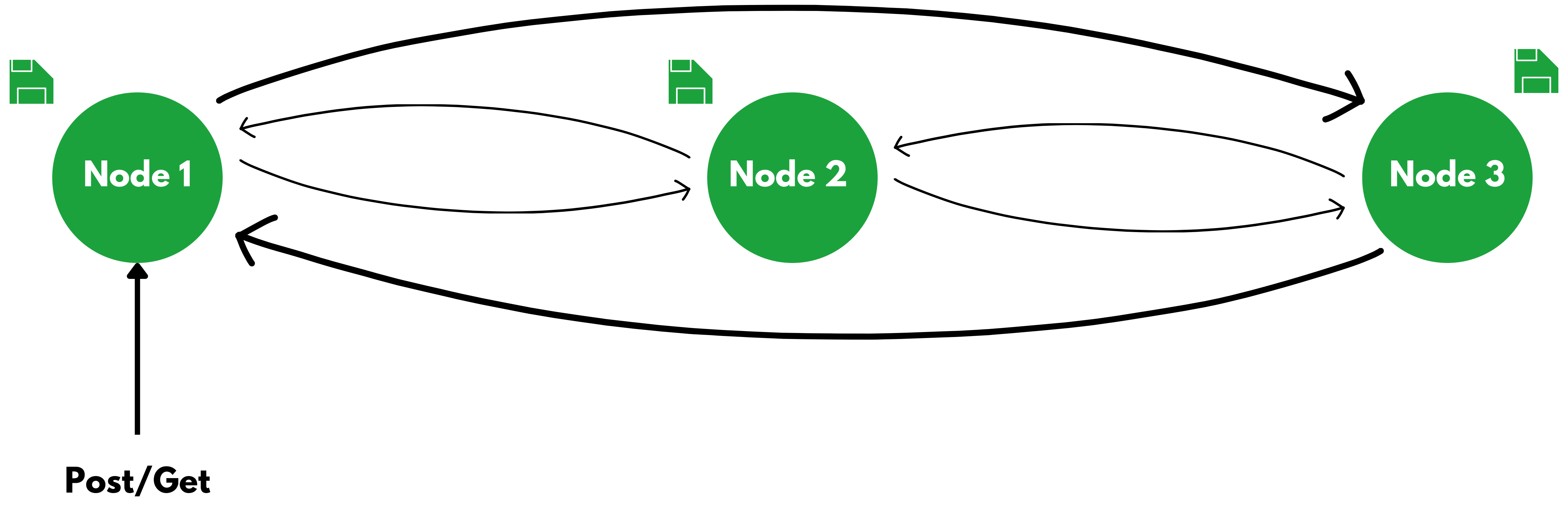
Arquitetura P2P with cache

Decentralized Peer-to-Peer (P2P) network where all nodes (peers) have equal status and communicate directly with each other.

If in the same session, the same Sudoku is posted, the system returns automatically the solution that was previously calculated. Bedsides that, each individual square and its solution are also stored for replacing in the Sudoku grid the previous calculated square.



Protocolo

Peer-to-Peer (P2P) network focusing on message exchange for tasks like joining nodes, keeping connections alive, and handling Sudoku puzzle-solving jobs.

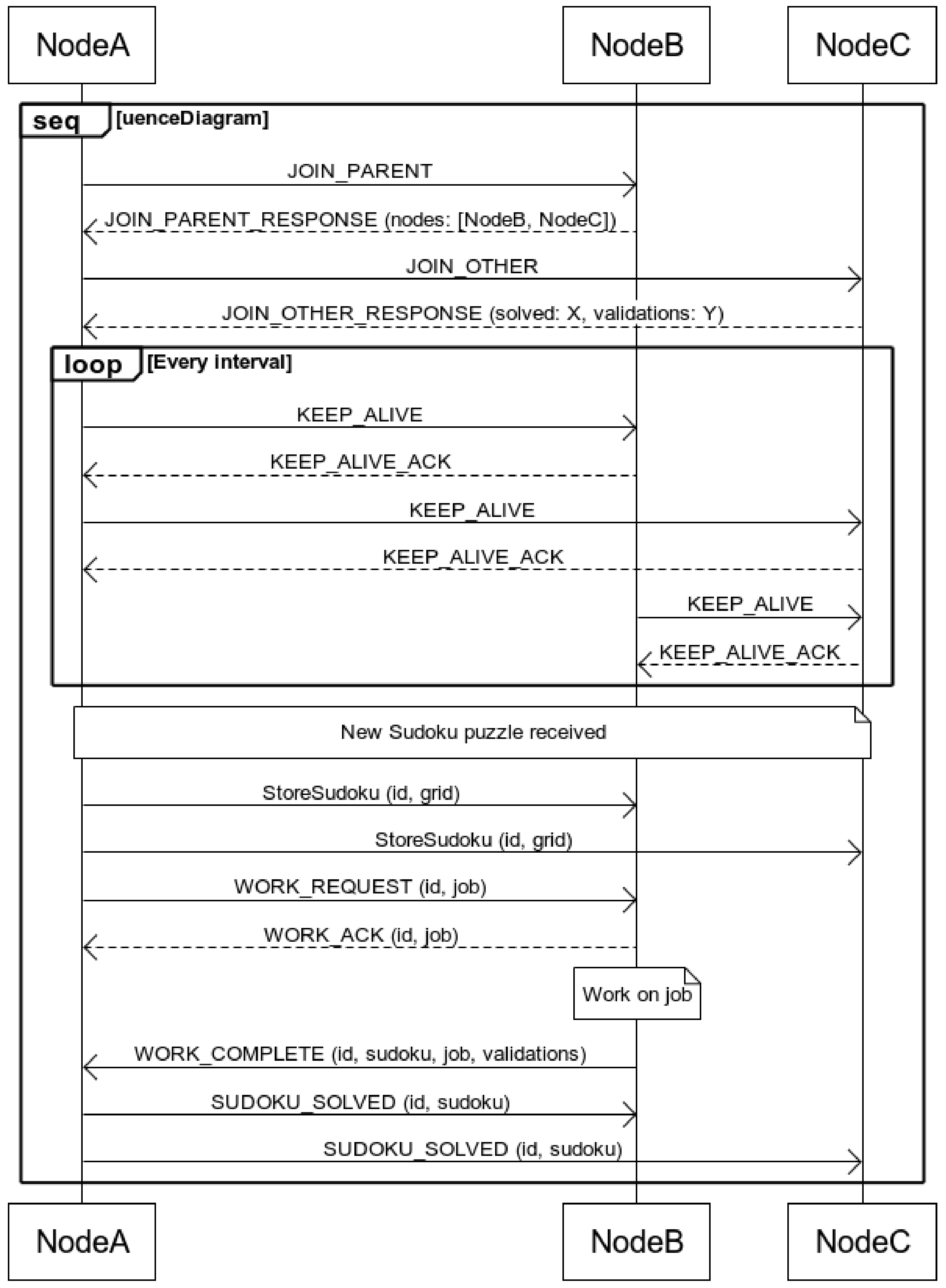
Commands

- JOIN_PARENT: Connect to a specified parent node.
- JOIN_PARENT_RESPONSE: Receive a list of all nodes from the parent.
- JOIN_OTHER: Request to join other nodes.
- JOIN_OTHER_RESPONSE: Receive stats from other nodes.
- KEEP_ALIVE: Ping to ensure node is active.
- WORK_REQUEST: Request a node to perform a job.
- WORK_ACK: Acknowledge receipt of a work request.
- WORK_COMPLETE: Notify job completion.
- SUDOKU_SOLVED: Notify that a Sudoku puzzle is solved.

Messages

- JoinParent: Request to parent for the list of nodes.
- JoinParentResponse: Response with all nodes' list.
- JoinOther: Request stats from nodes.
- JoinOtherResponse: Node stats response (solved puzzles, validations).
- KeepAlive: Scheduled ping to check node activity.
- StoreSudoku: Inform nodes of a new Sudoku puzzle.
- WorkRequest: Assign a Sudoku job to a node.
- WorkAck: Acknowledge a work request.
- WorkComplete: Notify job completion and update stats.
- SudokuSolved: Notify all nodes when a Sudoku is solved.

Diagrama de sequência



BenchMarkings

Nº nós / Nº lacunas	2	3	4
3	3,46	3,43	3,38
4	3,54	3,52	3,54
5	3,66	3,71	3,70

Algoritmo

For each Sudoku grid, we divided each board into 9 sections (jobs). Each job is then placed on a data structure where each available node handles the next unresolved section of the board. This way, when the system is running, there are 3 states: **pending**, **in_progress** and **completed**.

The jobs that are completed by nature, are not even considered into the algorithm and are automatically marked as completed.