



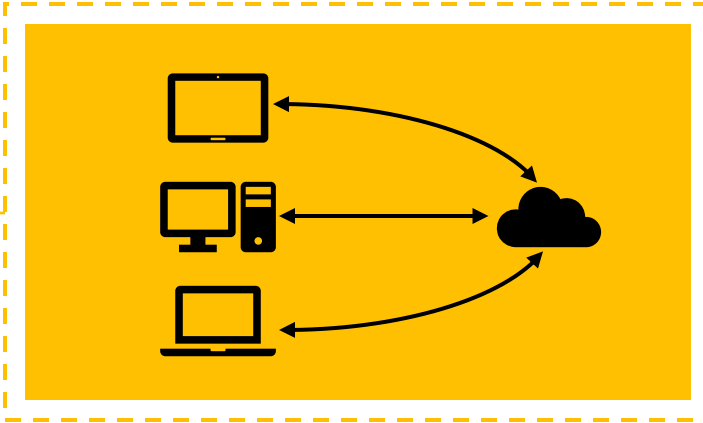
Universität St.Gallen

Bachelor Project

Local First Software

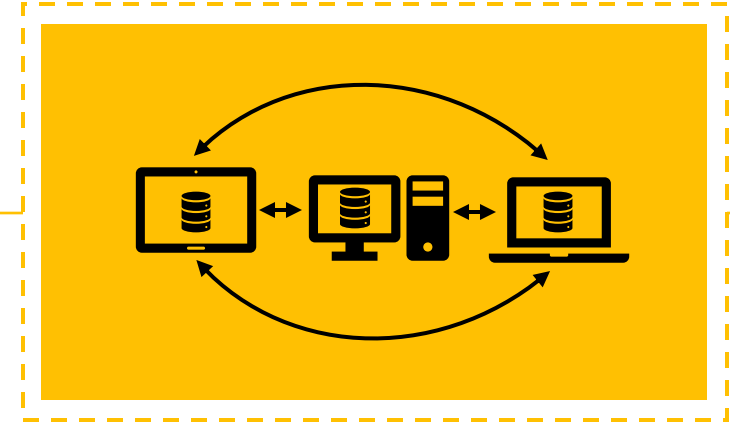
Teo Field-Marsham
Max Beringer

What is Local First



Cloud First

- Centralized Data Storage
- Requires Internet Access
- Cost for high Usage



Local First

- Offline availability
- Full Data Ownership
- Data privacy

Example: Peritext

- A collaborative text editor
- Uses Conflict-free Replicated Data Types (CRDTs)
- It's Google Docs, but you don't need to rely on Google's servers



Intuitive Strategies: Git-style merging

- Git-style merging
 - Needs user intervention

```
kb@kb:~/example$ git branch
conflicting_branch
* master
kb@kb:~/example$ git merge conflicting_branch
Auto-merging README.md
CONFLICT (content): Merge conflict in README.md
Automatic merge failed; fix conflicts and then commit the result.
```



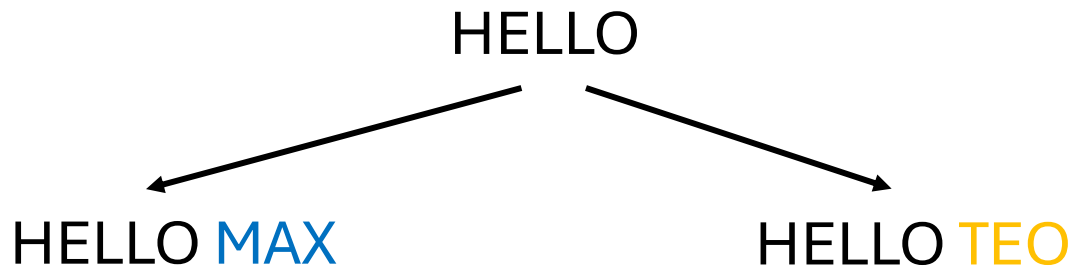
Intuitive Strategies: Last-Write-Wins

- Last-Write-Wins (LWW)
 - No real collaboration

Time	User A	User B
11:50:31	apple	
11:51:46		banana
12:45:10	apple	
13:05:15		banana
13:06:50	apple	
14:08:17		banana
15:03:03	apple	

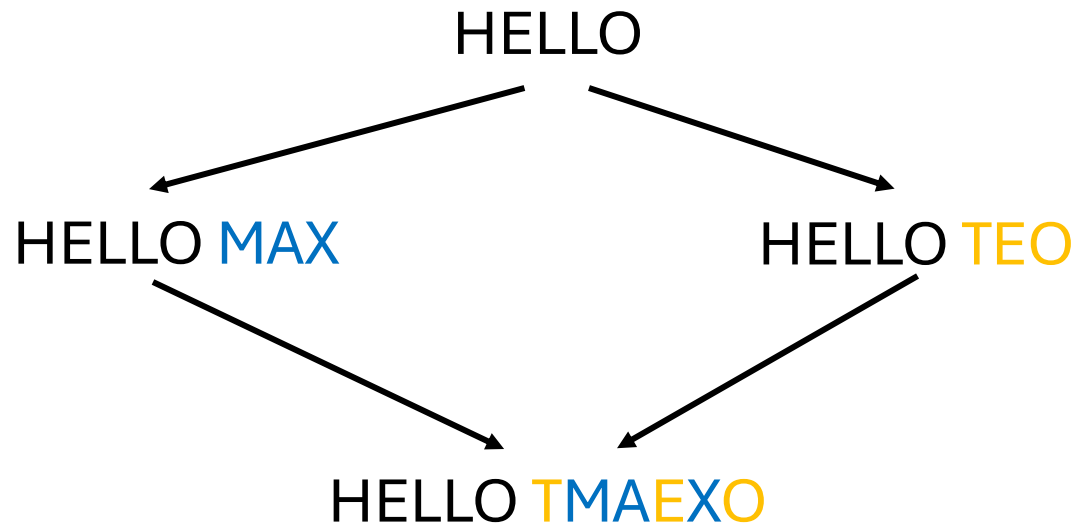
Intuitive Strategies: Line-by-Line Merge

- Line-by-Line Merge (Textual Merge)
 - Doesn't work on logical structure



Intuitive Strategies: Line-by-Line Merge

- Line-by-Line Merge (Textual Merge)
 - Doesn't work on logical structure



Our Project

- Collaborative Excel Formula Editing
- Automatic Synchronization
 - Conflict-free
- Merge Algorithm
 - Idempotent
 - Associative
 - Communicative



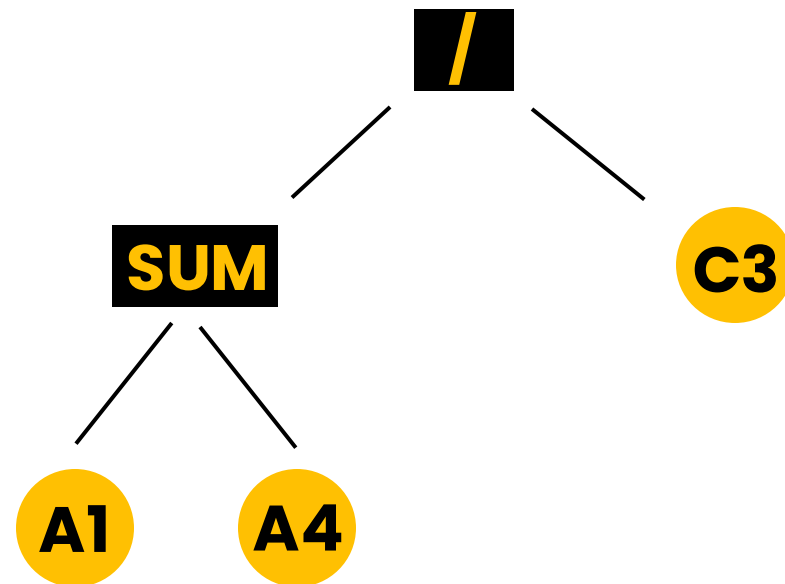
Our Approach

$$= \text{SUM} (A1 ; A4) / C3$$

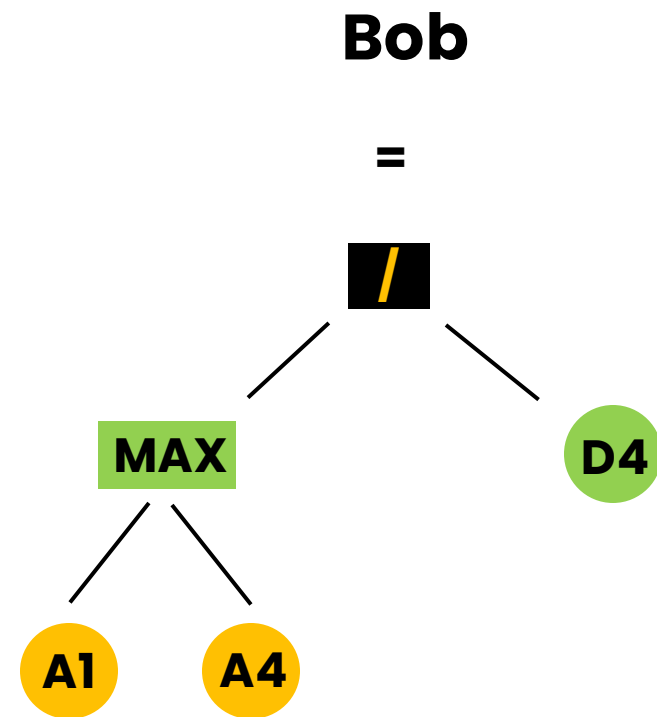
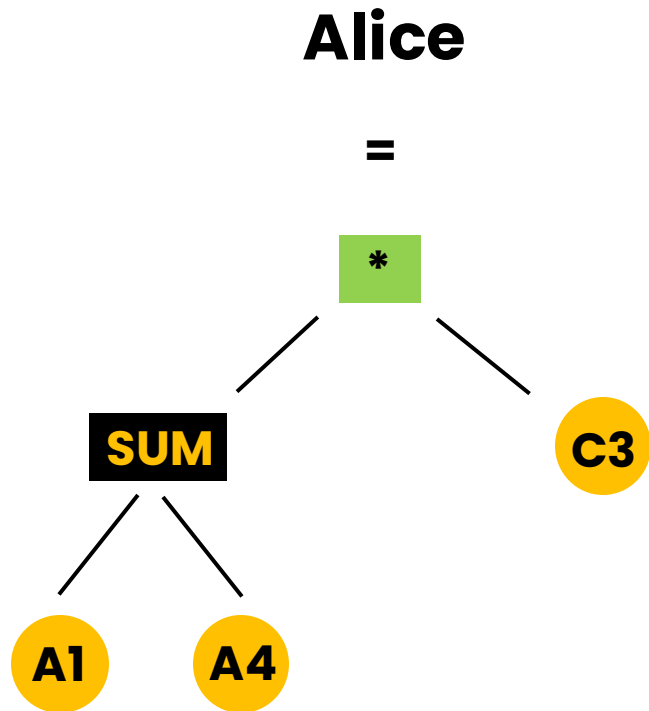
Our Approach

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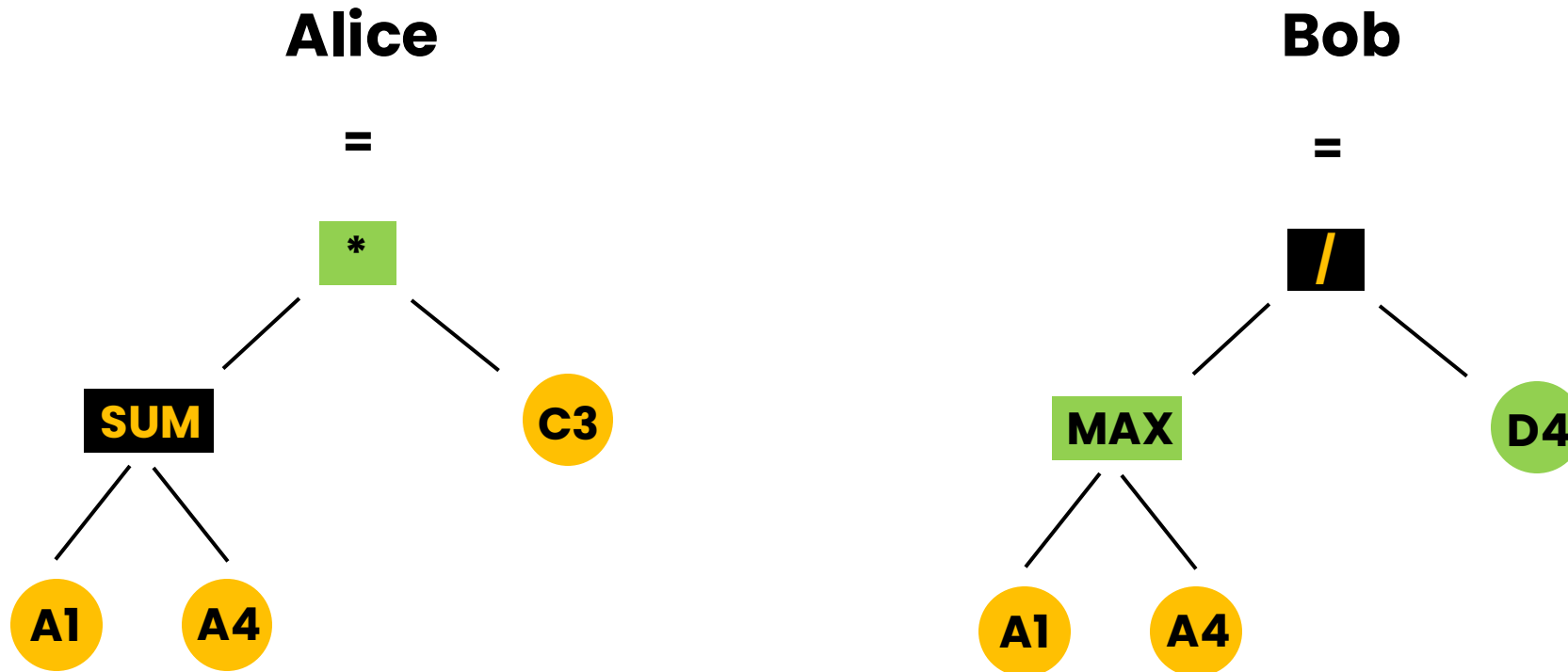
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Our Approach



Our Approach



Result = MAX(A1 ; A4) * D4



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Thank you for your attention!