A Collaborative Visual Database

by

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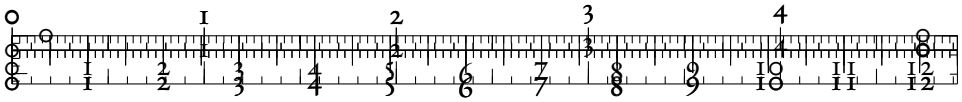
ESSTHS



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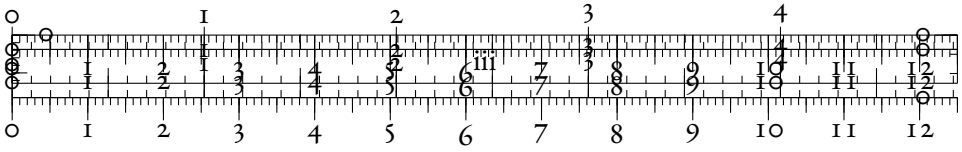

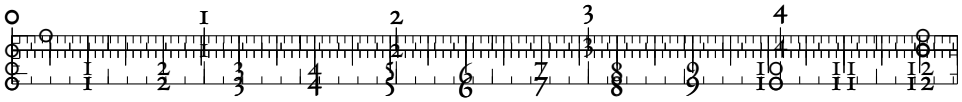

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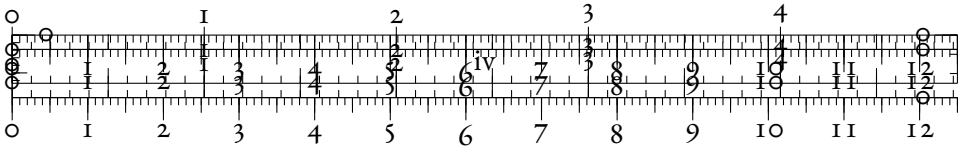

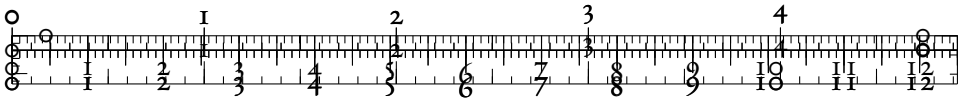

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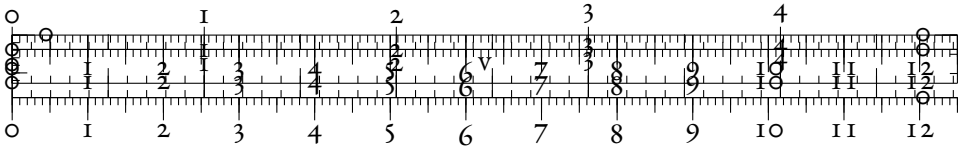
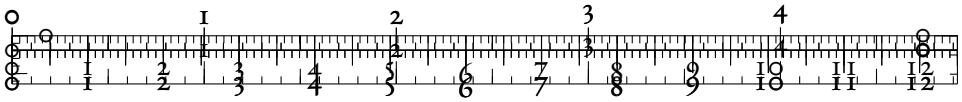




I Conceptual study

Confirm email

Upon receiving a confirmation email, the user has to click the confirm button, which sends a request to the server with the OTP. The server validates the password and either accepts it and authenticates the user, or refuses it and alarms them about the error. Since having users check their email every time is a poor User Experience (UX), the server uses time-limited browser cookies for storing the user's authentication state.

Figure 1.1 represents the sequence diagram for "confirm email".

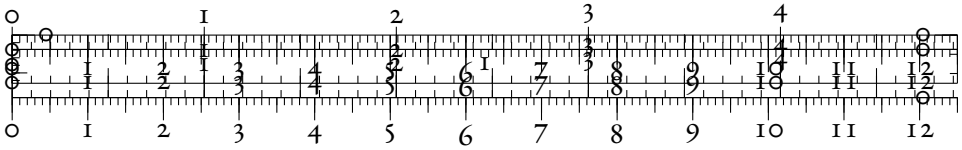
Create workspace

Whenever a user creates a new workspace, we only ask for a name, and we intentionally create everything they may need to start working. This is because an empty workspace is intimidating and can slow on-boarding process for new users. The same process is followed whenever the user creates a project, a collection, or a document.

Figure 1.2 represents the sequence diagram for "create workspace".

Create collection

Figure 1.3 represents the sequence diagram for "create collection".



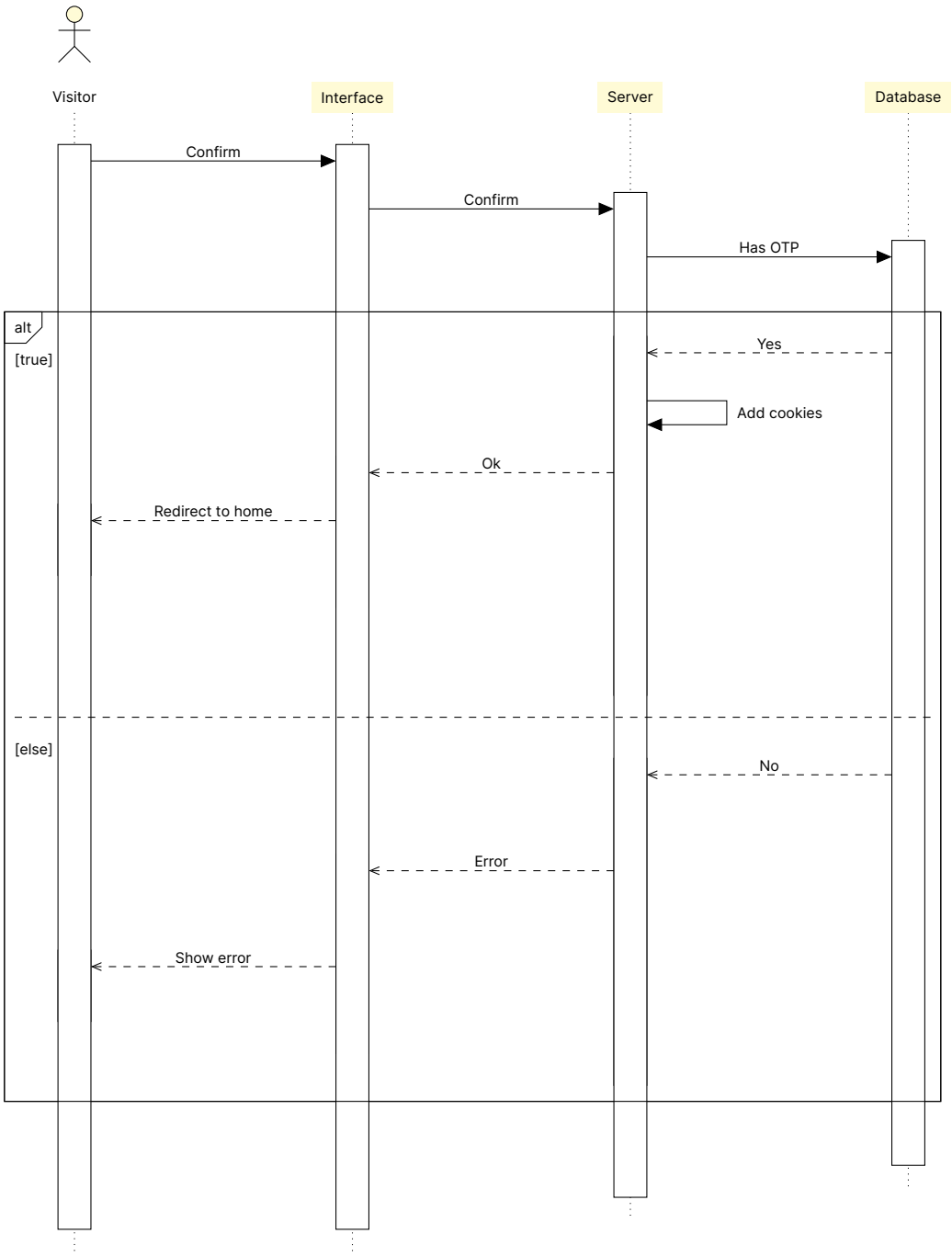


Figure 1.1: “Confirm email” sequence diagram

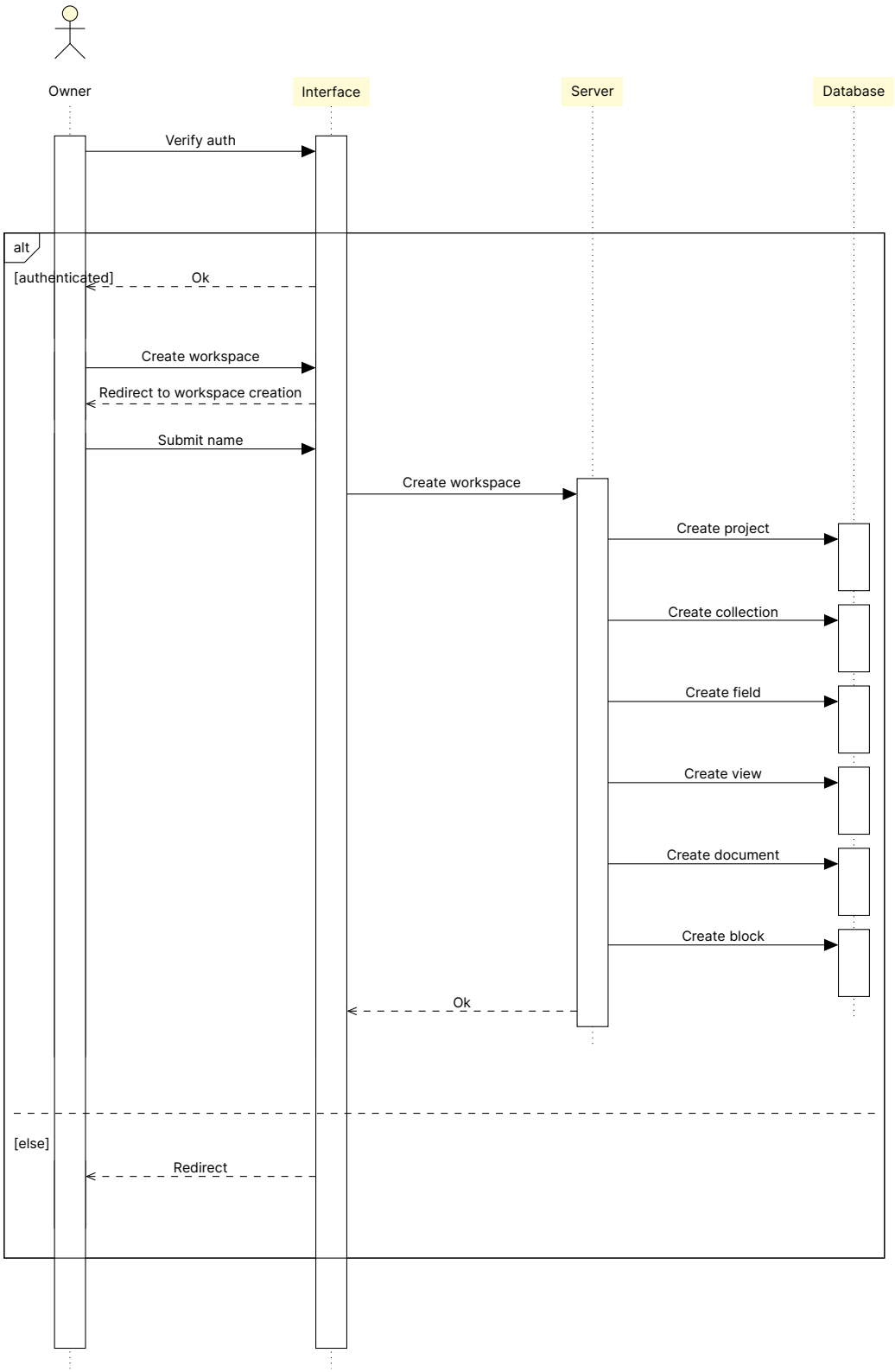


Figure 1.2: “Create workspace” sequence diagram

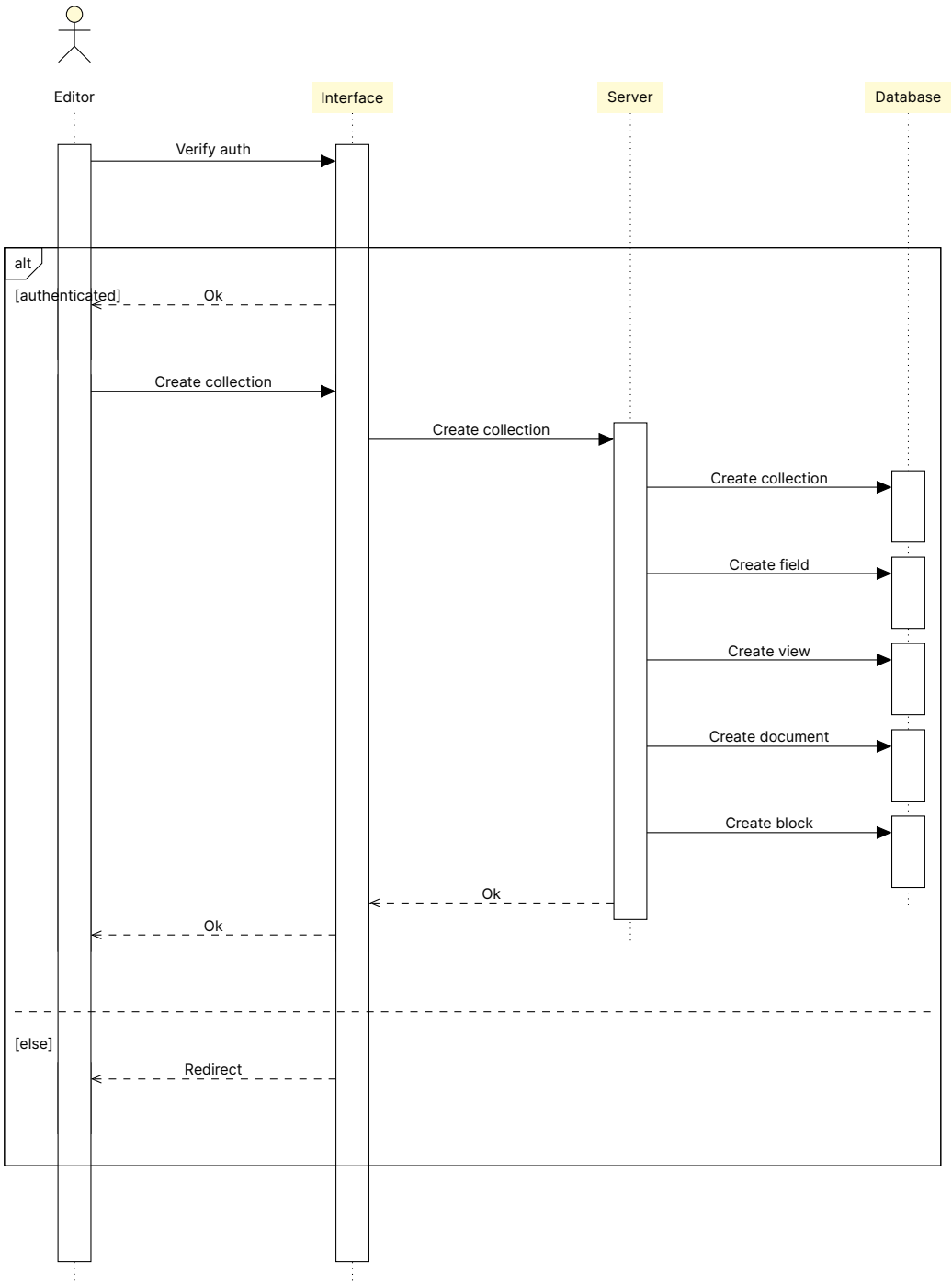


Figure 1.3: “Create collection” sequence diagram

Create field

Figure 1.4 represents the sequence diagram for “create field”.

Update block

Updating a block is the most common task in our application. It happens within milliseconds and it is quickly propagated to all the connected collaborators. This work by first updating the local state in order to give the effect of an immediate change. Then, the updated block is sent to the server, which would compare its version with the one stored in the database—our source of truth. The equality of versions means that the user has an up-to-date local state, and therefore, their change is accepted and sent to the other users. However, the unequality of versions indicates that the user’s local state is out-of-date. Since they are online, they will eventually get the missing updates. So, their change is refused. The same method applies to updating fields too.

Figure 1.5 represents the sequence diagram for “update block”.

1.1 Conclusion

In this chapter, we analyzed the possible architectures of the different aspects of our applications, compared them, and made an objective choice. Then, we proceeded to present, in details, the architecture of our application.

Within the next chapter, we are going to glue all the pieces of research and theory together, and bring our application to life.

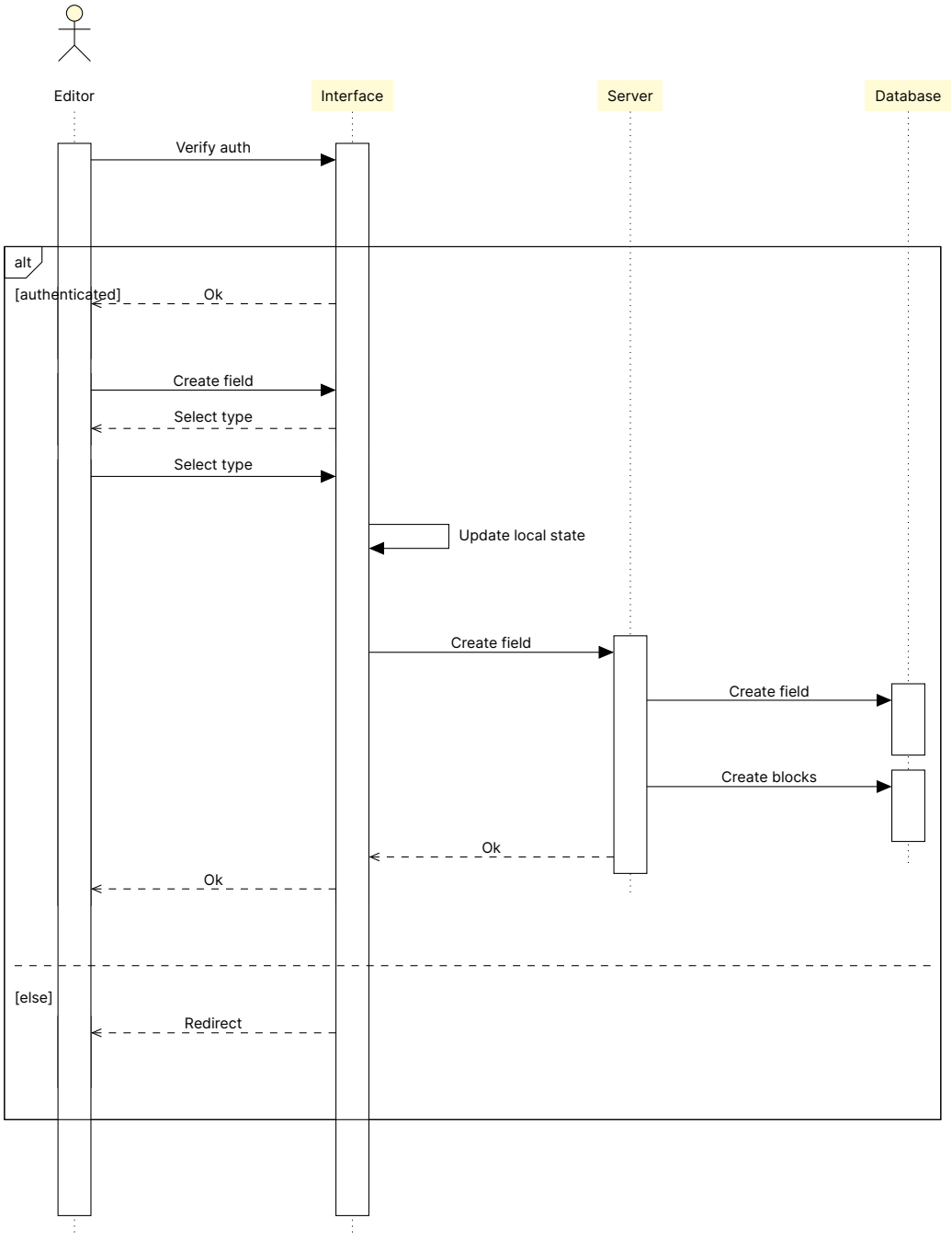


Figure 1.4: “Create field” sequence diagram

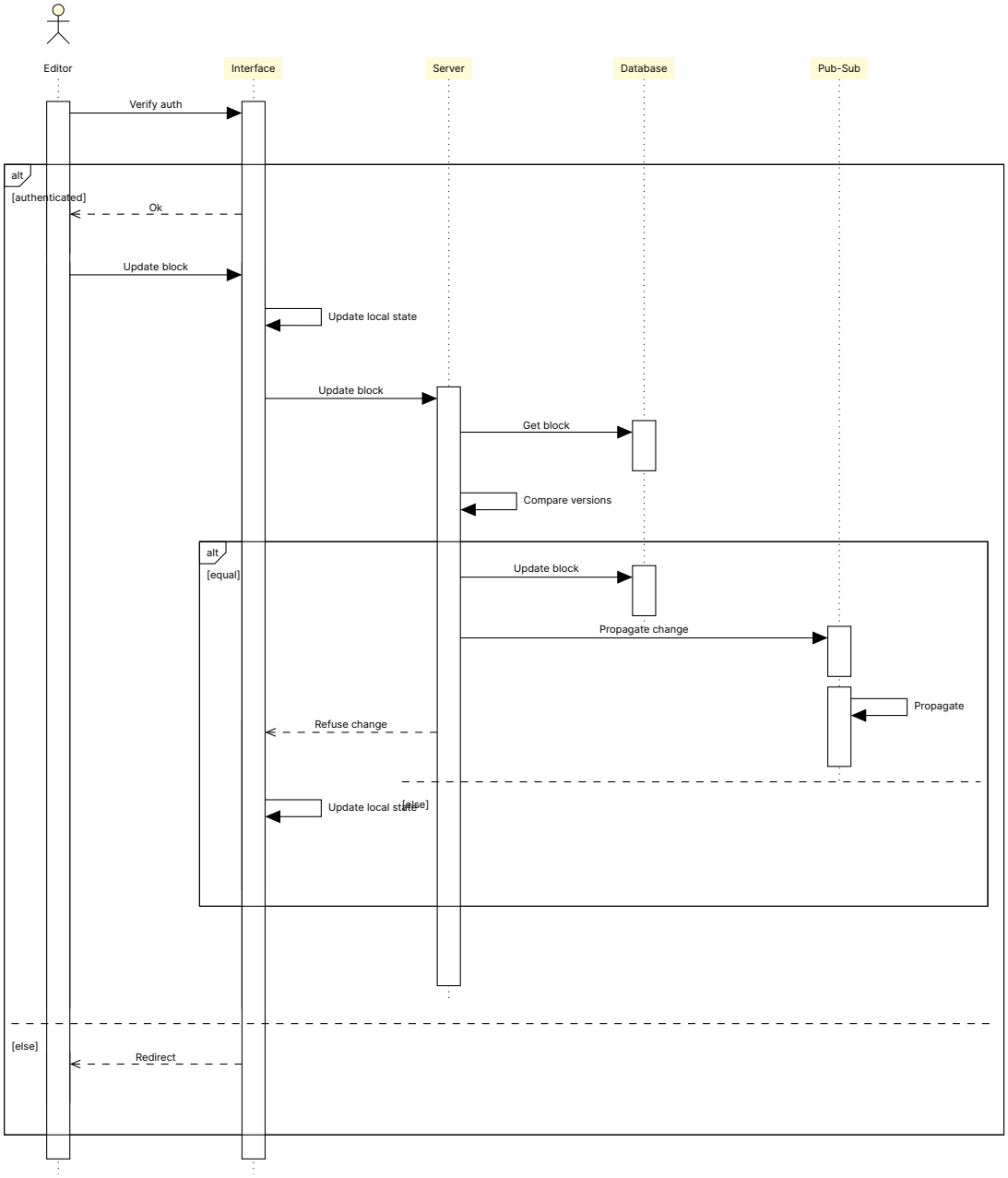
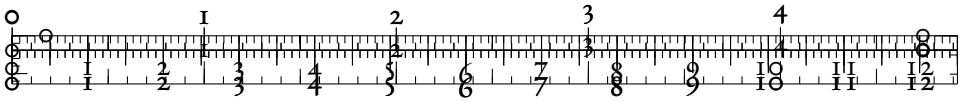


Figure 1.5: “Update block” sequence diagram



Acronyms

CmRDT Commutative Replicated Data Type

CMS Content Management Software

CRDT Conflict-free Replicated Data Type

CvRDT Convergent Replicated Data Type

DOM Document Object Model

FDD Feature-Driven Development

JSON JavaScript Object Notation

MVC Model-View-Controller

MVVM Model-View-ViewModel

OT Operational Transformation

OTP One-Time Password

P2P Peer-To-Peer

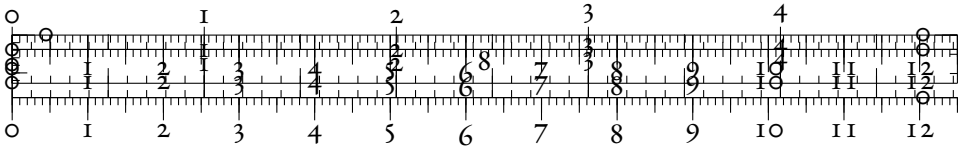
RBAC Role-Based Access Control

RDMBS Relational Database Management System

SaaS Software as a Service

SDK Software Development Kit

SSPL Server Side Public License

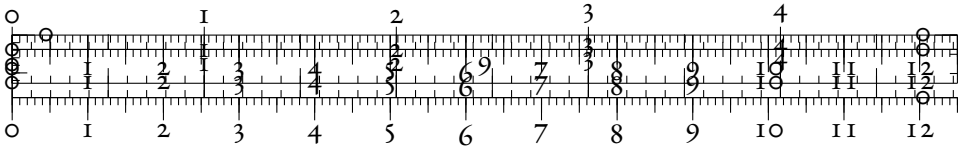


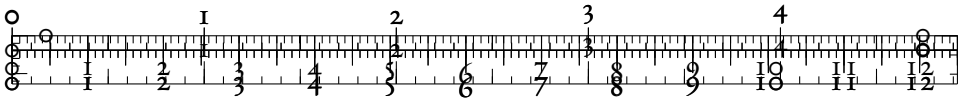
UI User Interface

UX User Experience

WAI-ARIA Web Accessibility Initiative – Accessible Rich Internet Applications

WOOT WithOut Operational Transformation

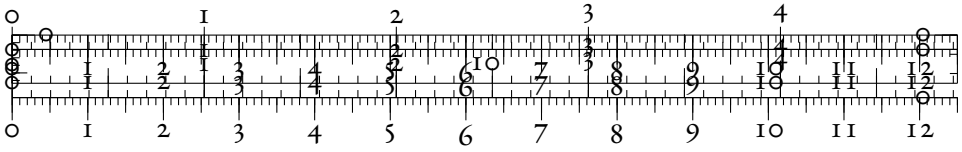


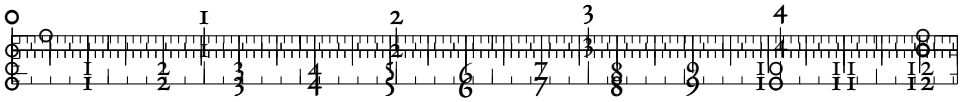


Glossary

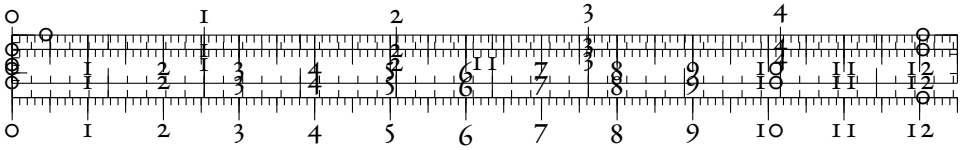
cacheable A cacheable response is an HTTP response that is stored to be retrieved and used later, saving a new request to the server [1].

polyfill A piece of code used to provide modern functionality on older browsers that do not natively support it [2].





Bibliography

[1] *Cacheable - MDN Web Docs Glossary: Definitions of Web-related terms | MDN*. en-US. URL: https://developer.mozilla.org/en-US/docs/Glossary/cacheable (visited on 06/07/2021).

[2] *Polyfill - MDN Web Docs Glossary: Definitions of Web-related terms | MDN*. en-US. URL: https://developer.mozilla.org/en-US/docs/Glossary/Polyfill (visited on 06/07/2021).