

# CQRS and Event Sourcing

Oliver Sturm • @olivers • oliver@oliversturm.com



# Oliver Sturm

- Training Director at DevExpress
- Consultant, trainer, author, software architect and developer for over 25 years
- Contact: [oliver@oliversturm.com](mailto:oliver@oliversturm.com)

# Agenda

- CQRS - Why? When? How?
  - Sometimes there are choices
  - Sometimes the decision is natural
  - Consequences
- Event Sourcing
  - Again: Why? When? How?
- Eventual consistency

# Data Access, "Traditionally"

```
ImportantData editObject;

protected override void OnInit(EventArgs e) {
    editObject = LoadEditObject();
    control.DataSource = editObject;
    control.DataBind();
}

protected void Page_Load(object sender, EventArgs e) {
    if (IsPostBack) {
        MergeEditorChanges(editObject);
        SaveObject(editObject);
    } ...
}
```

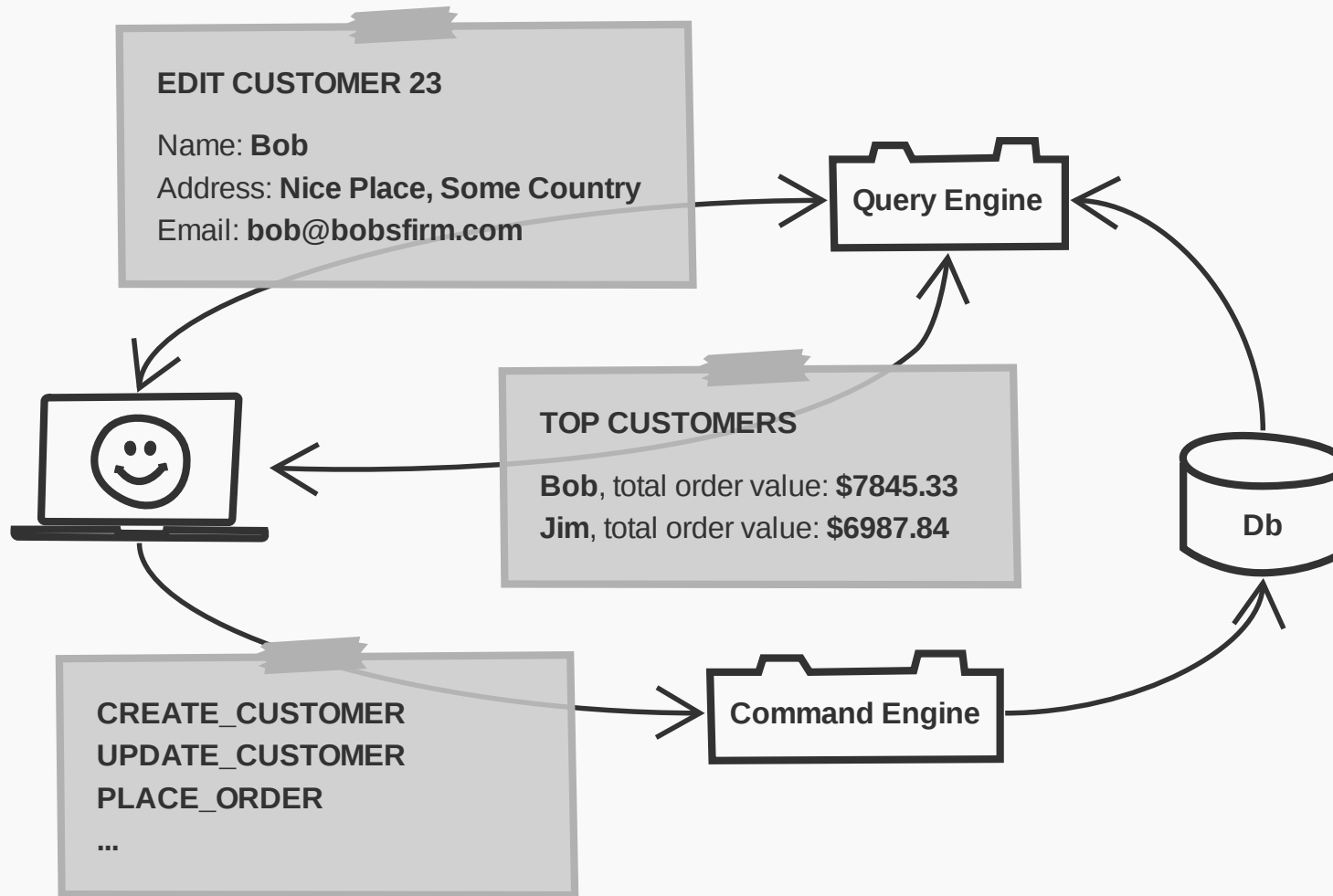
# Data Access, "Traditionally"

1. Objects are loaded into memory
2. Data is shown in UI
3. Changes are submitted
4. Loaded objects are modified
5. Local change detection optimizes process of persistence

# CQRS — Why?

- Because *loading data for visualization* doesn't have the same requirements as *persisting data*
- Because one *loading process* can be *different* from another
- Because one *persistence process* can be *different* from another
- Because we can save time in *page cycle* environments
- Because separate execution paths are *easier to test and maintain*

# CQRS



# CQRS — When?

- Almost *anytime*!
- Typical doubts:
  - Pure client app — do I benefit?
  - More complex structure == more complicated maintenance work?
  - But what about ORM?
- Reality:
  - Structural advantages *benefit any architecture*
  - *Complex != complicated*, complex systems can have simple parts
  - Maybe we don't always need ORM...



# CQRS — How?

- *Separate execution paths* for data reading and writing
- Consider modeling *changes as commands*
- Consider *efficient data models* to support business operations

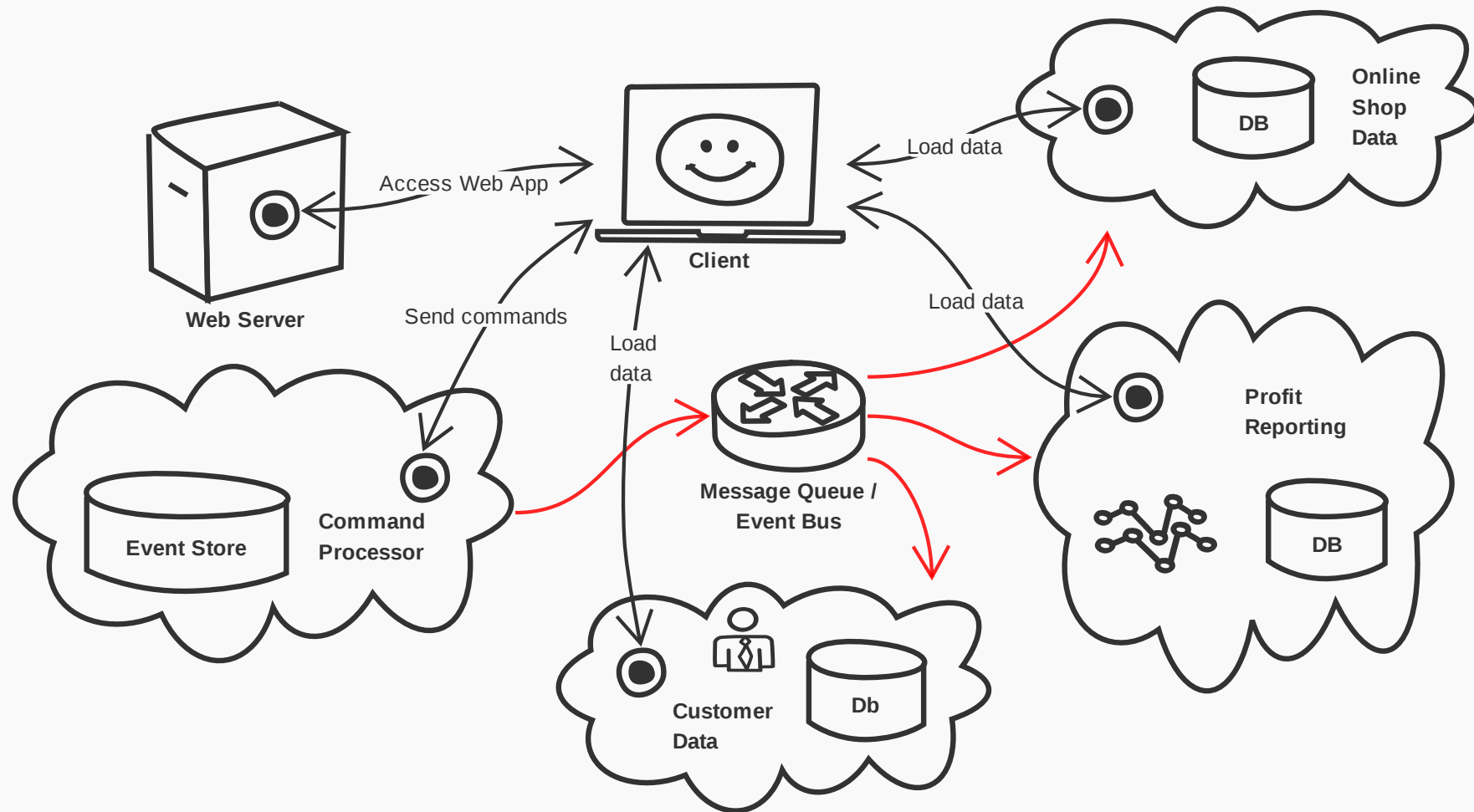
# Event Sourcing

- Starting from *command* idea
  - Primarily *persist events*, instead of data
  - *Append-only* event log
  - *Derive entity state* at any time, for any point in time
- Entities/Aggregates/domain objects
- Optimizations: snapshots, projections, (persistent) read models

# Event Sourcing — Why?

- Events describe what the system was asked to do, any *technical consequences of an event are not set in stone*. Fantastic for long-term maintenance!
- Clean, extensible and scalable structure supports *strict separations of concerns*
- Event Storming — very practical planning method

# CQRS and Event Sourcing



# Event Sourcing — When?

- Tempting pattern for many applications, but with structural consequences (complexity)
- Very "clean complexity"
- *In real-world well structured service based apps generally a good recommendation*
- In-process, in full-fat clients? Possible...

# Event Sourcing — How?

- Easy part: *receive commands*
- Raising domain events across service boundaries requires *communication infrastructure*
- Persisting events and possibly read models requires a *persistence layer*
- Structural maintenance of *aggregates and projections* is a bit fiddly, especially in typed languages
- Recommended: *use libraries existing for all platforms*

**DEMO**

# Eventual Consistency

Consistency is over-rated (Greg Young, Mr CQRS)

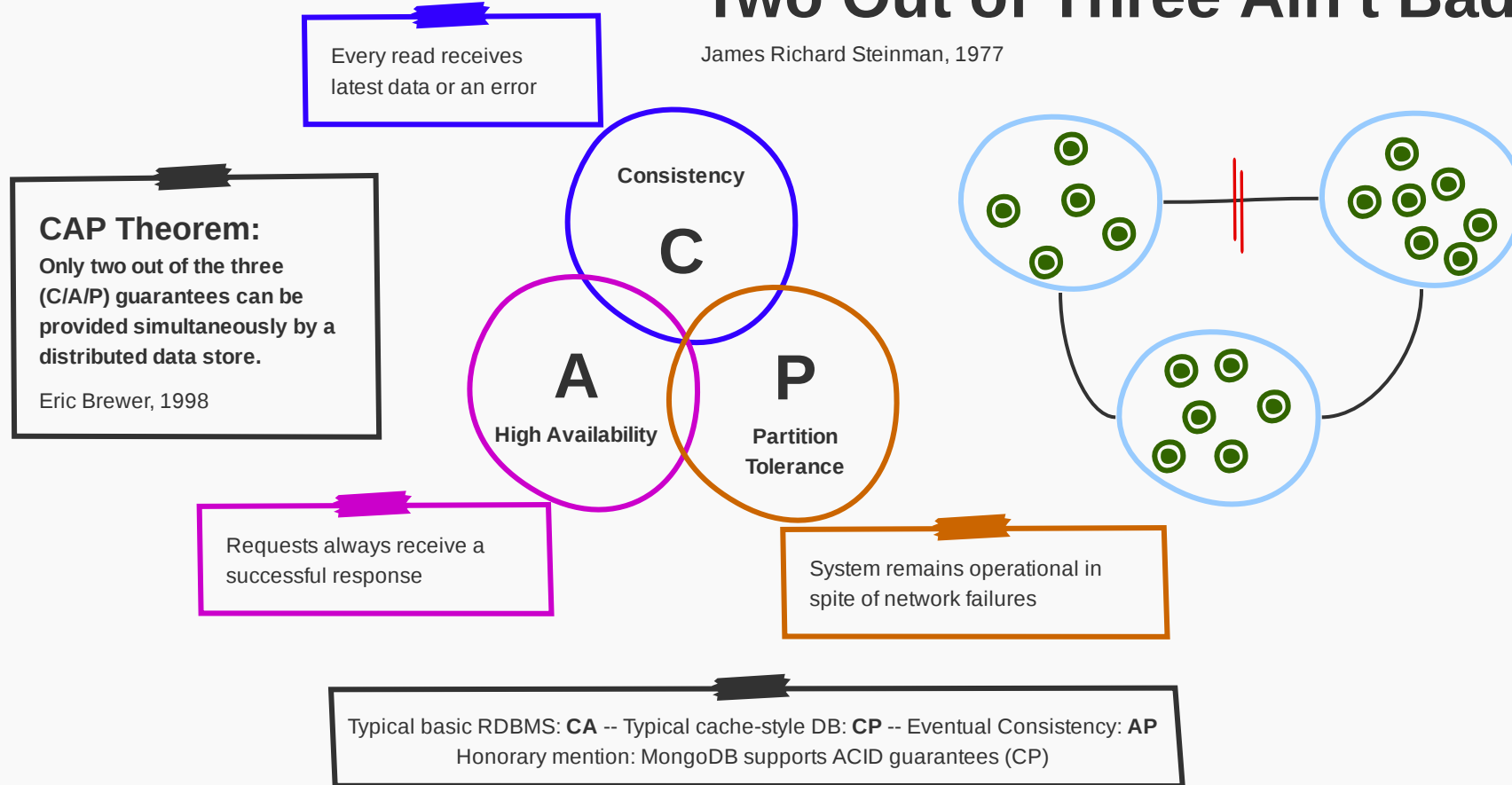
- General issue in distributed systems - CAP theorem
- Eventual consistency exists in the real world. Starbucks?
- How eventual are things in your system?
- Business logic needs to deal with issues resulting from eventual consistency
  - Compensation
  - Special programming tactics
  - Check this out: <http://queue.acm.org/detail.cfm?id=2462076>



# CAP Theorem

## Two Out of Three Ain't Bad

James Richard Steinman, 1977



# Sources

- This presentation:
  - <https://oliversturm.github.io/cqrs-event-sourcing>
  - PDF download: <https://oliversturm.github.io/cqrs-event-sourcing/slides.pdf>
- Demo code:
  - <https://github.com/oliversturm/one-day-fullstack-complete>

# Thank You

Please feel free to contact me about the content anytime.

Check out reSolve: <https://reimagined.github.io/resolve/>

Oliver Sturm • @olivers • oliver@oliversturm.com

