# CQRS and Event Sourcing

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## Oliver Sturm

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## 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”

- Objects are loaded into memory
- Data is shown in UI
- Changes are submitted
- Loaded objects are modified
- 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

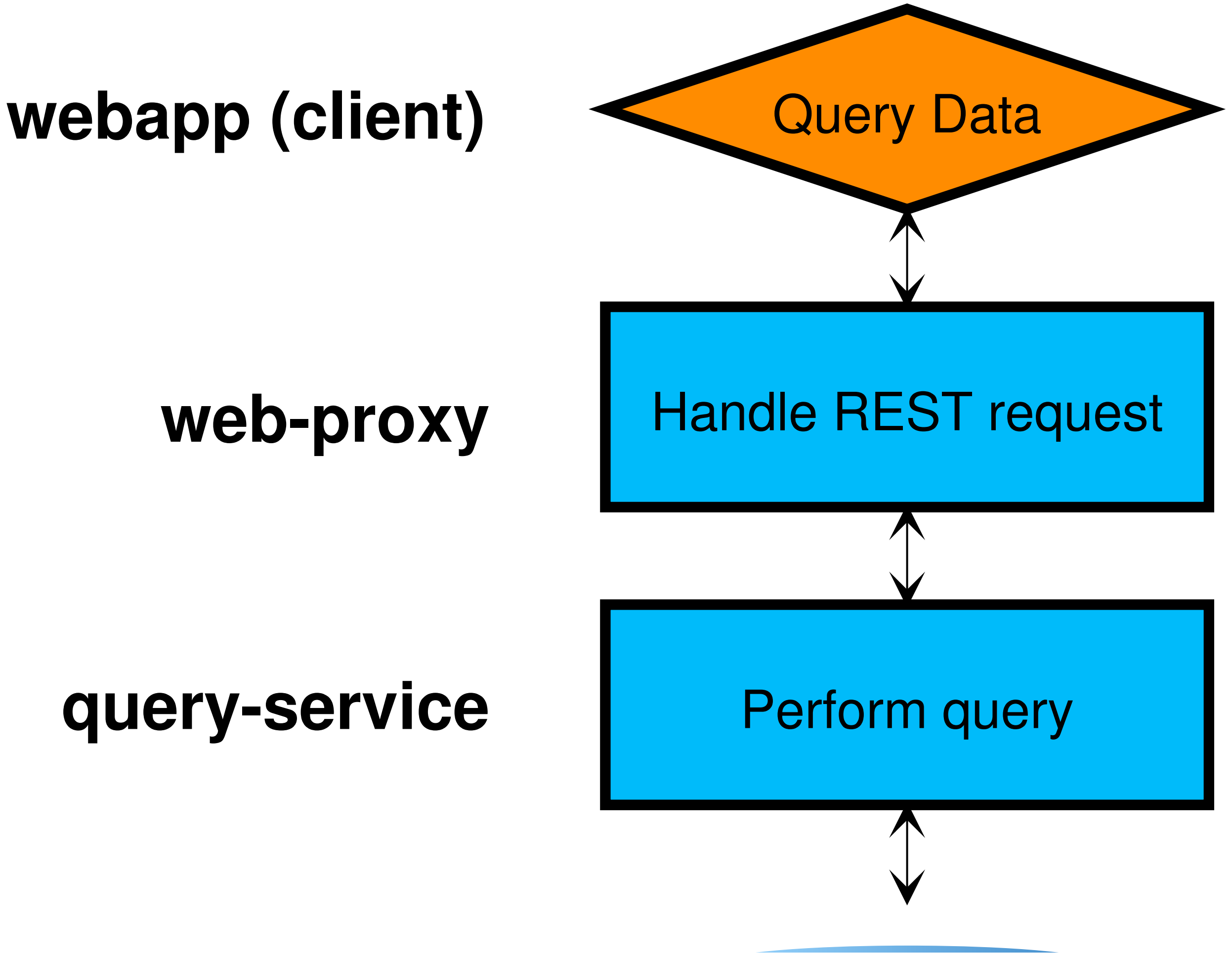
## CQRS — When?

- Almost anytime!
- Typical doubts:
  - Pure client app — do I benefit?
  - More complex structure == more complicated maintenance work?
  - But what about ORM?

## CQRS — How?

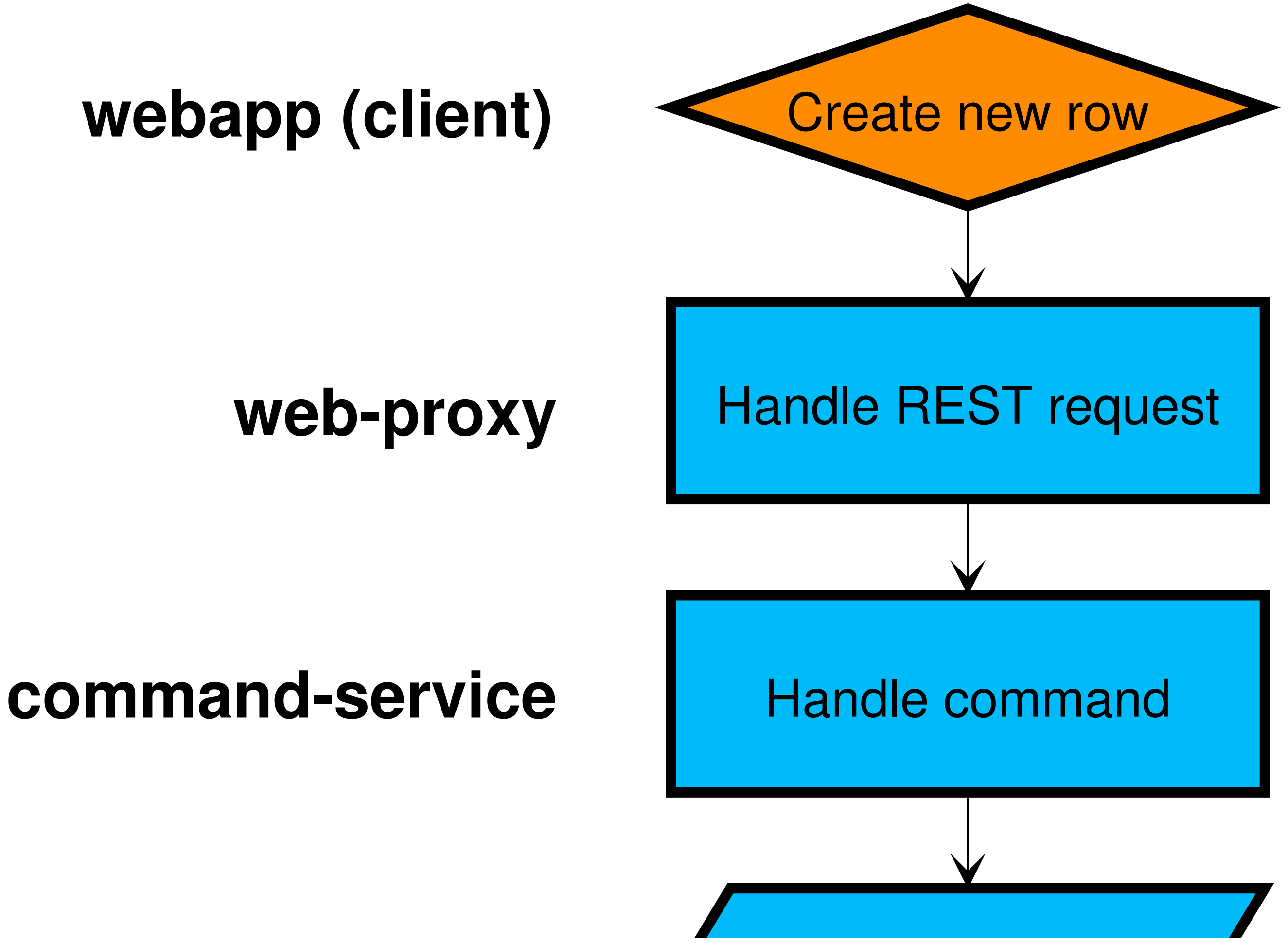
- Separate execution paths for data reading and writing
- Consider modeling changes as commands
- Consider efficient data models to support business operations

## Querying data



**mongo**

## Creating a new row



**mongo**

## 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, supporting strict separations of concerns.
- Event Storming — very practical planning method

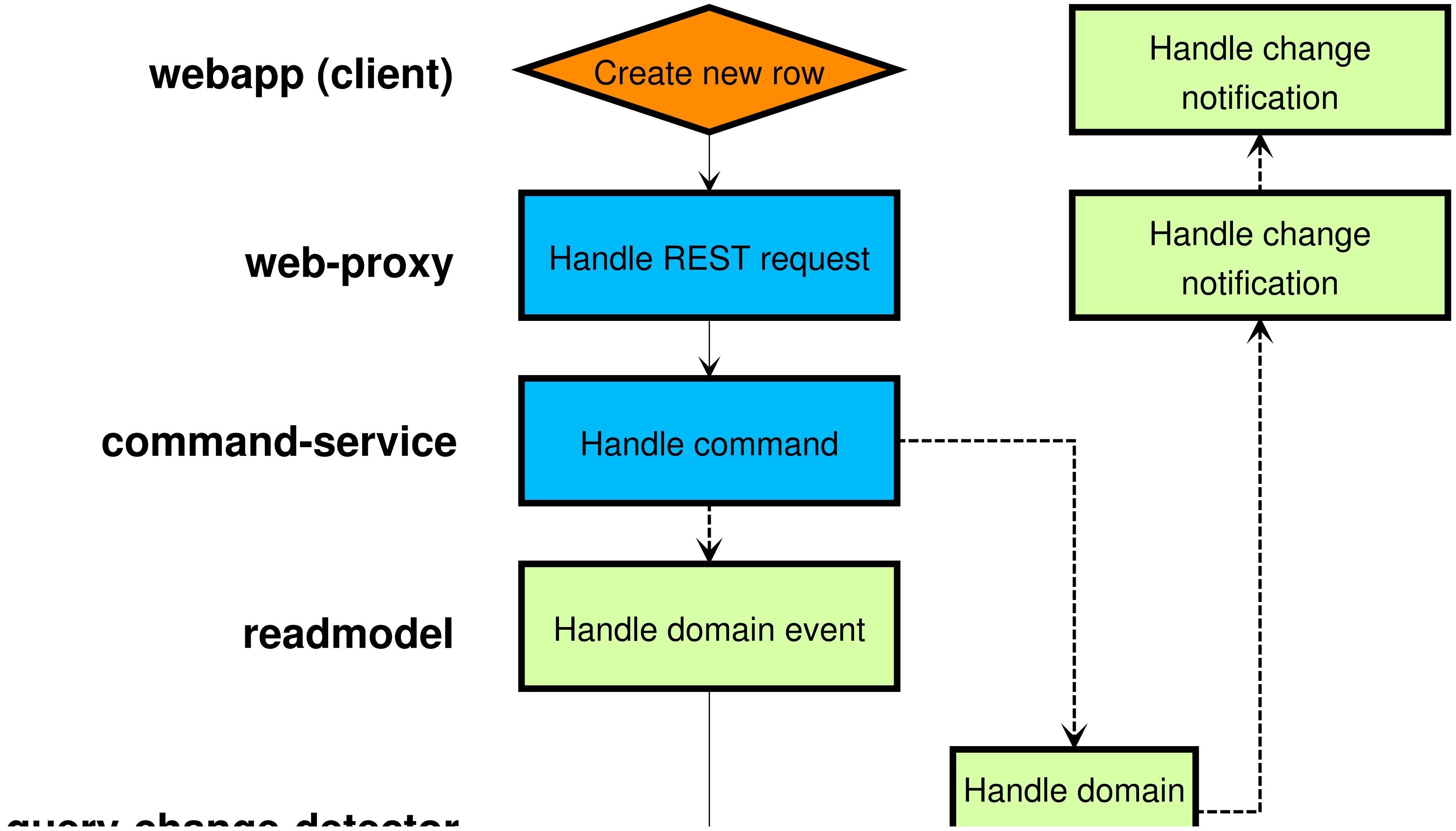
## Event Sourcing — When?

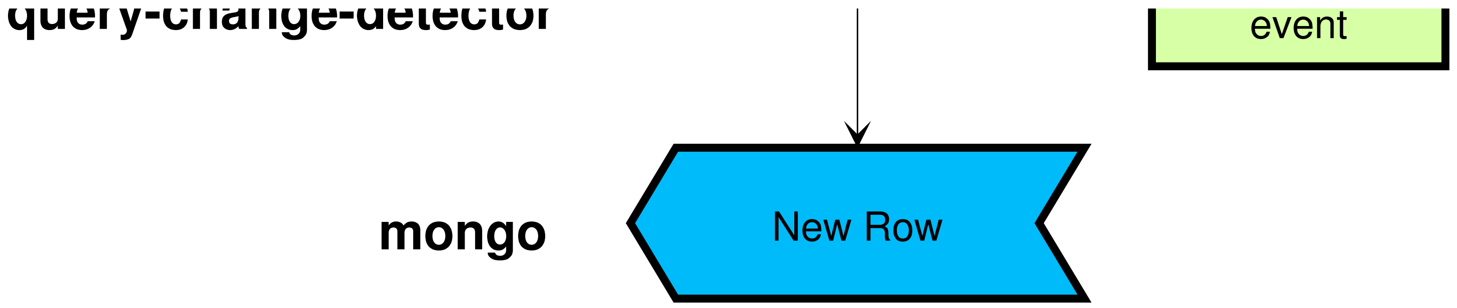
- Tempting pattern for many applications, but with structural consequences
    - In-process? Possible…

## Event Sourcing — How?

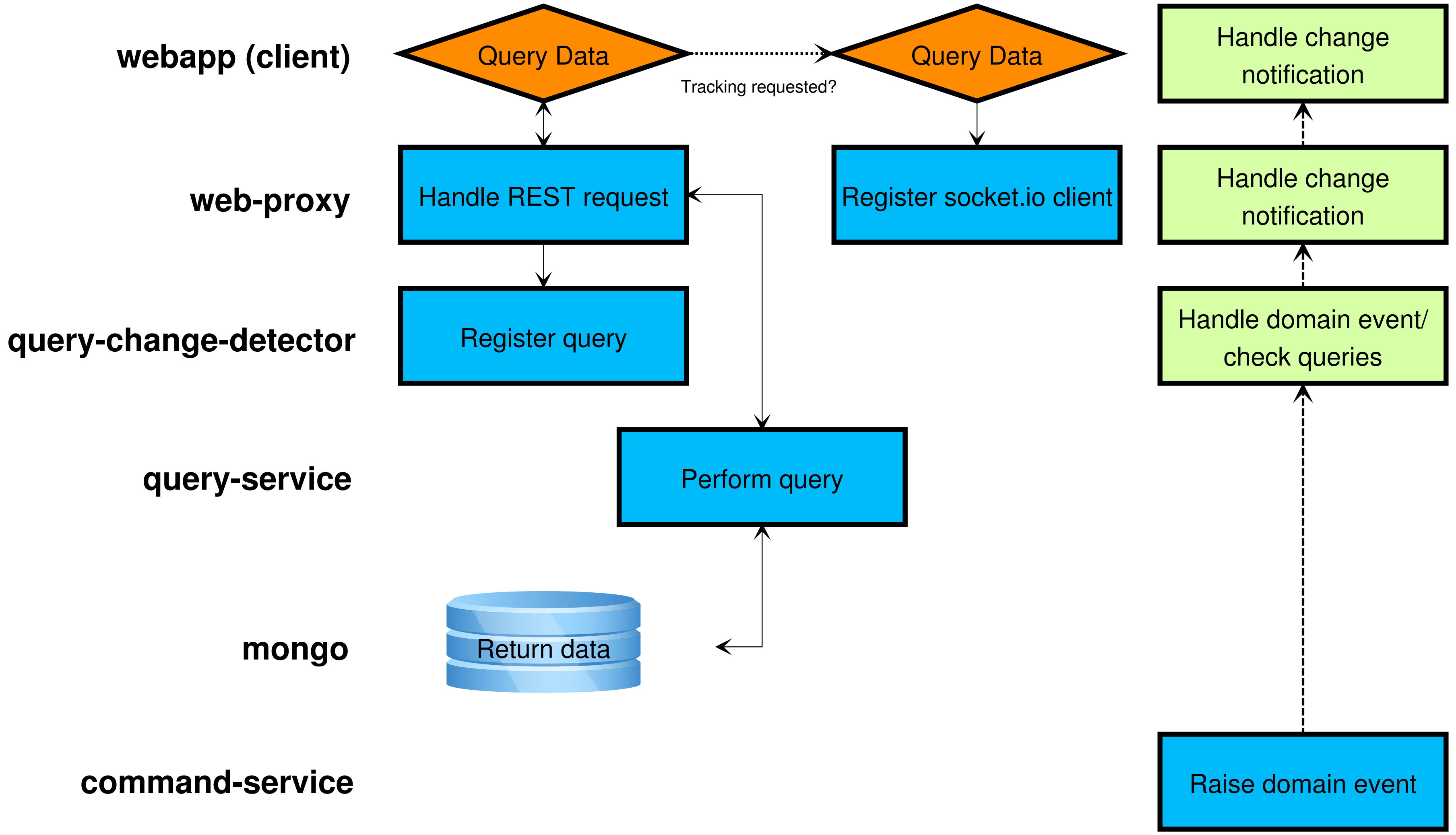
- Any service can receive commands
- Raising domain events across service boundaries requires communication infrastructure
- Persisting events and possibly read models requires a persistence layer
- Structural maintenance of aggregates and projections is a bit fiddly
- Recommended: use libraries existing for all platforms

## Creating a new row with CQRS/ES




query-change-detector
event
mongo
New Row

## Querying data with CQRS/ES


webapp (client)
web-proxy
query-change-detector
query-service
mongo
command-service
Query Data
Tracking requested?
Query Data
Handle change notification
Handle REST request
Register socket.io client
Handle change notification
Register query
Handle domain event/ check queries
Perform query
Return data
Raise domain event

## 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

## Sources

- This presentation:
    - https://oliversturm.github.io/cqrs-event-sourcing
    - Deprettified content in pdf format: https://oliversturm.github.io/cqrs-event-sourcing/slidecontent.pdf
- Demo code:
    - https://github.com/oliversturm/cqrs-grid-demo (check *event-sourcing* branch)

## Thank You

Please feel free to contact me about the content anytime.

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