

CQRS and Event Sourcing

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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

webapp (client)

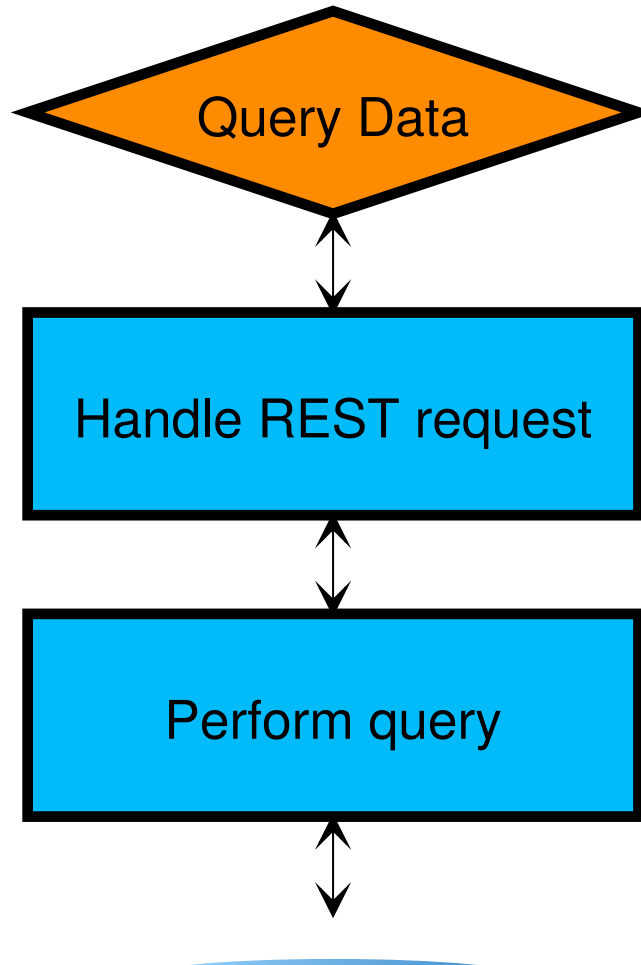
Query Data

web-proxy

Handle REST request

query-service

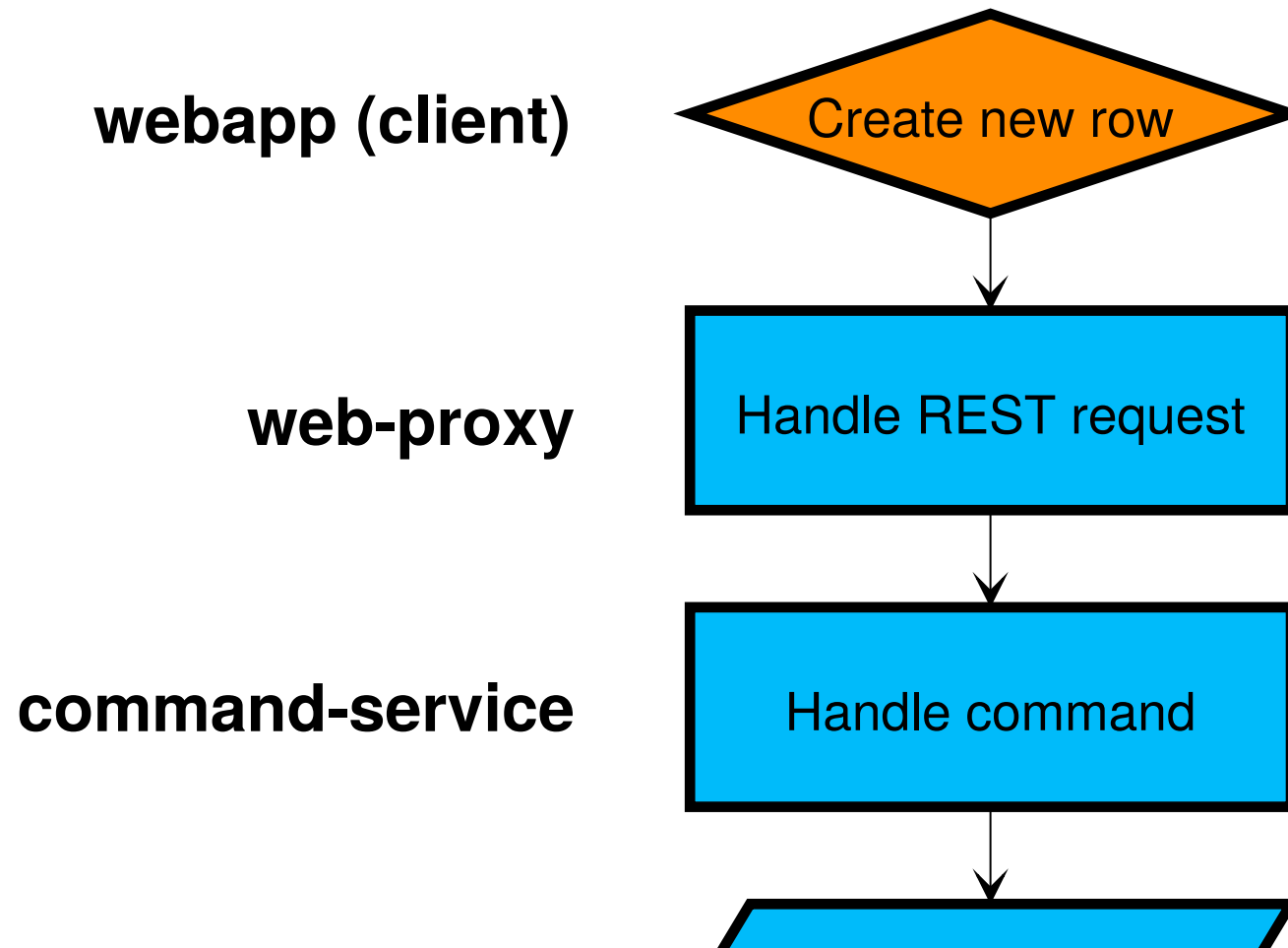
Perform query



mongo



Creating a new row



mongo



New Row

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

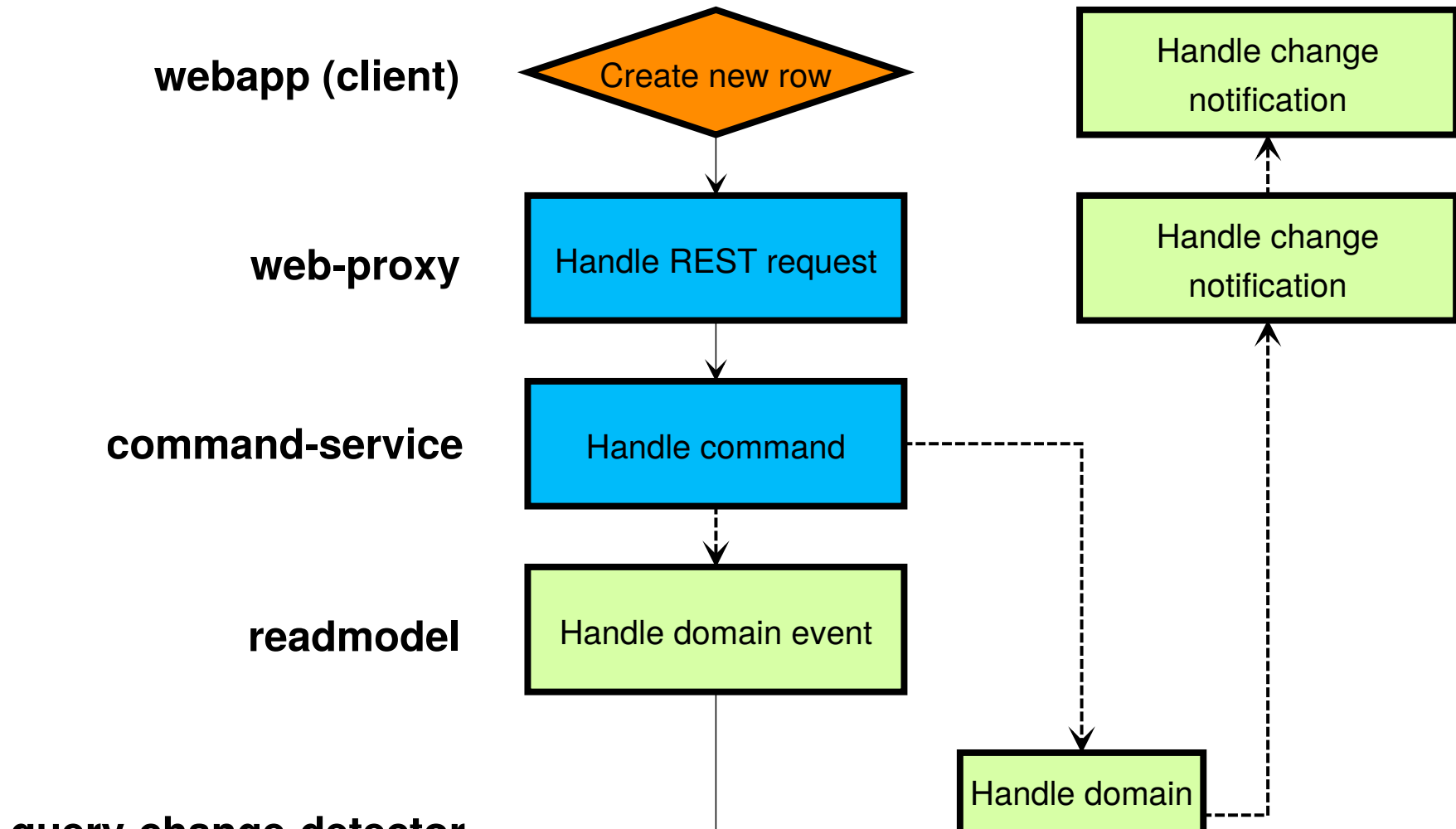
Event Sourcing — When?

- 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

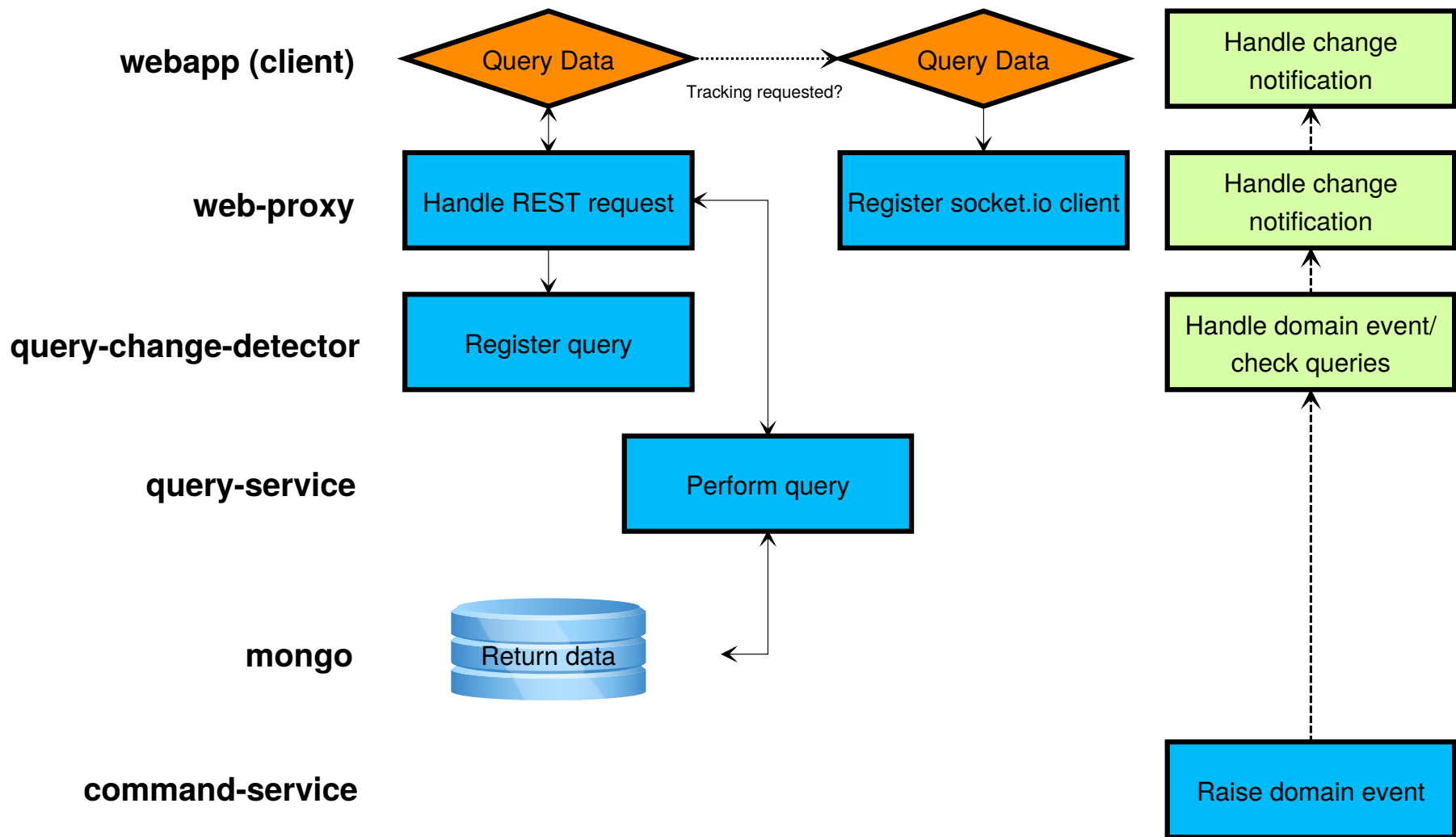
mongo

New Row

```
graph TD; QCD[query-change-detector] --> MR[New Row]; MR --> mongo[mongo]; mongo --> event[event];
```

The diagram illustrates a data flow process. A query-change-detector triggers a 'New Row' event, represented by a blue chevron shape. This event is then processed by 'mongo', which in turn triggers an 'event', represented by a light green rectangle.

Querying data with CQRS/ES



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* branches)

Thank You

Please feel free to contact me about the content anytime.

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