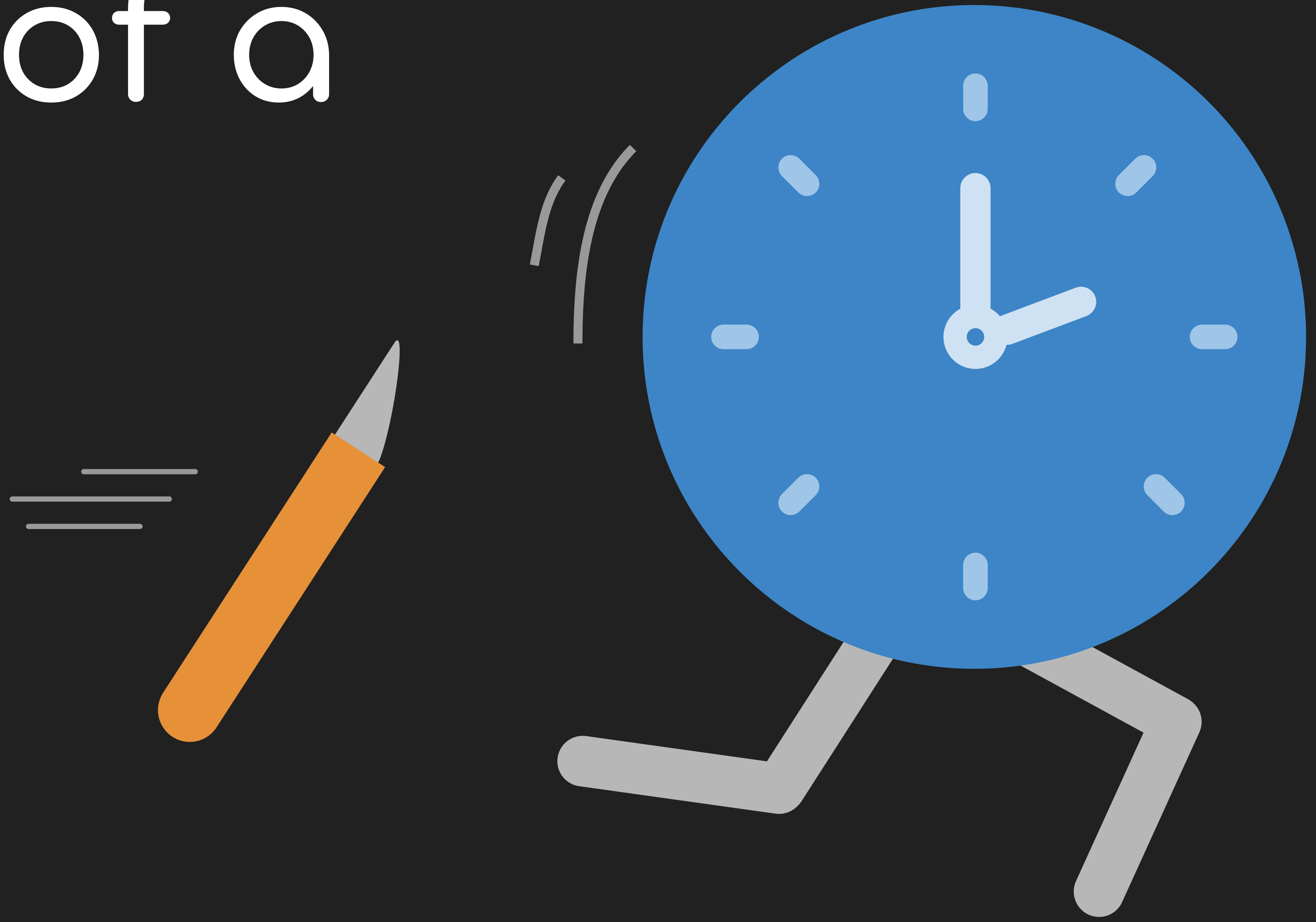
The Anatomy of a Distributed JavaScript Runtime



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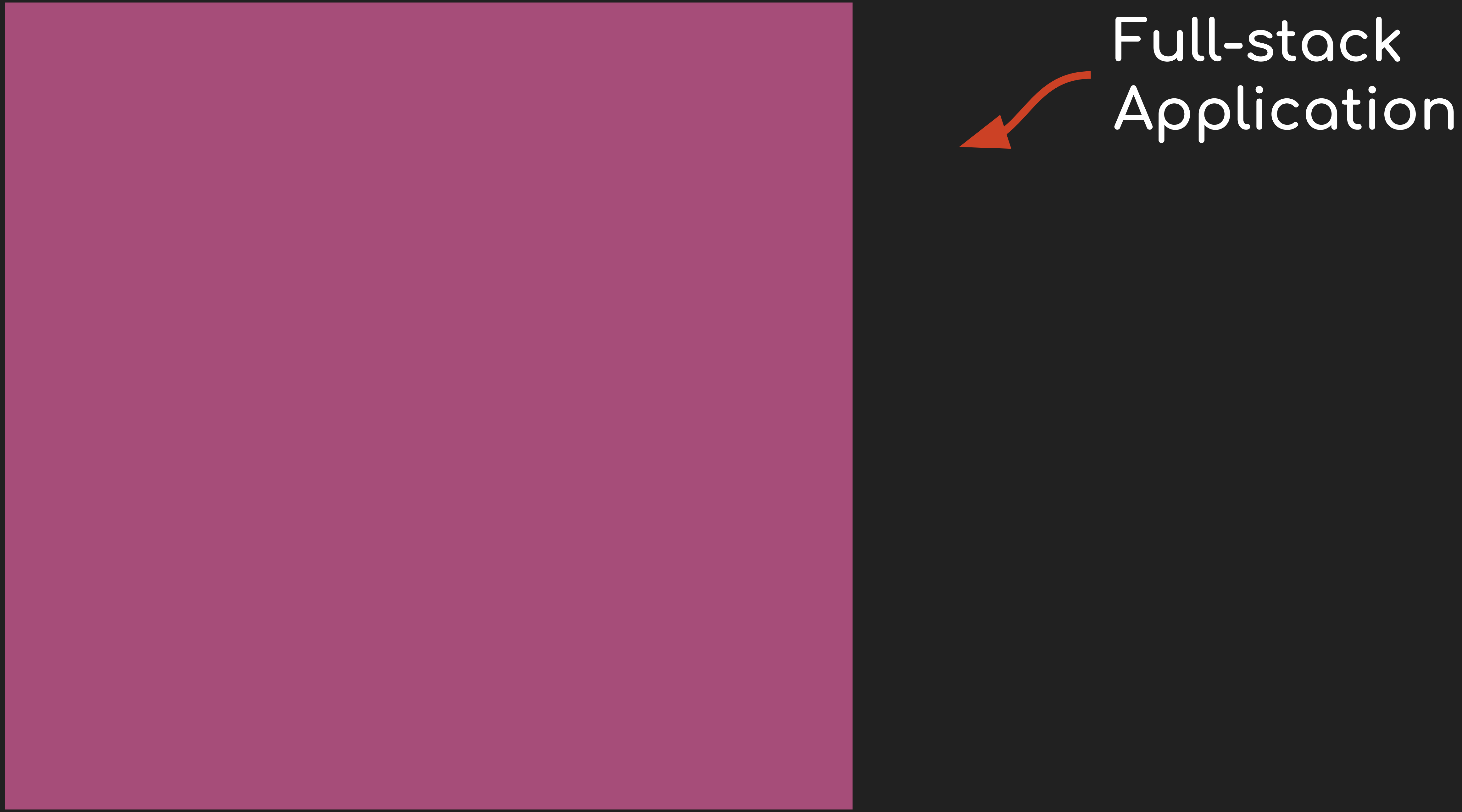
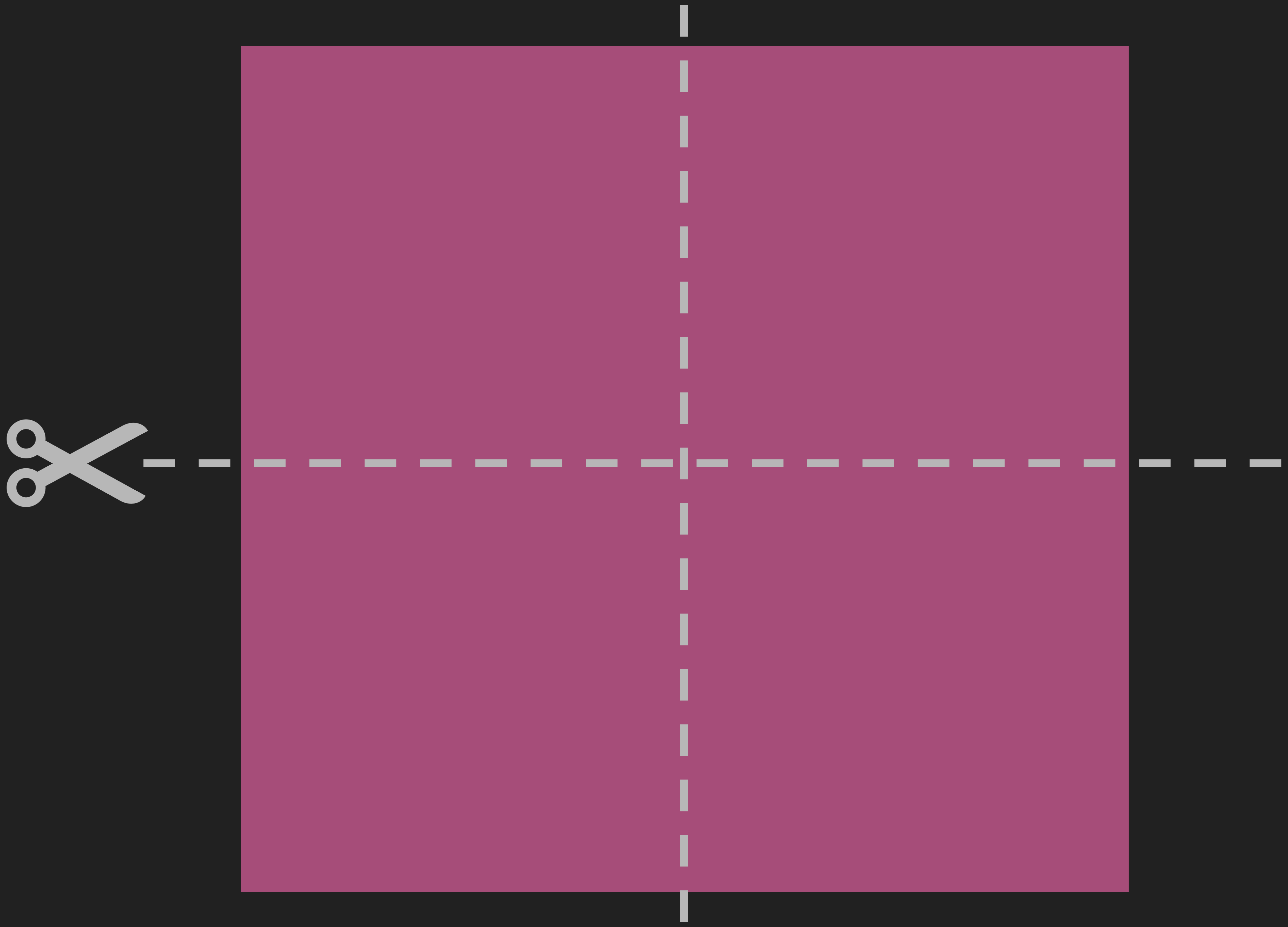
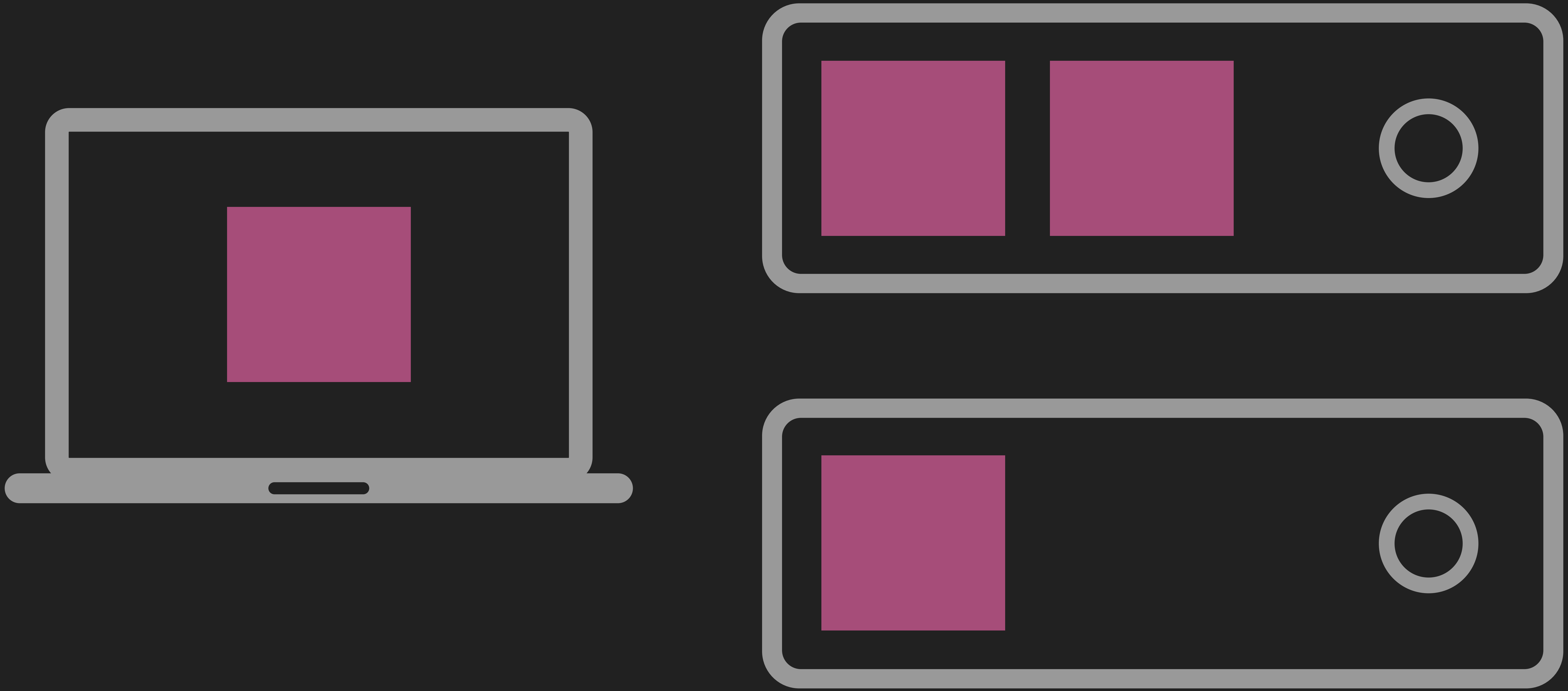
Jitar

Abbreviation:
Just-In-Time ArchitectuRe

https://jitar.dev


Full-stack Application





#1 Motivation & goals

#2 Splitting applications

#3 Running applications

#4 Distributing applications

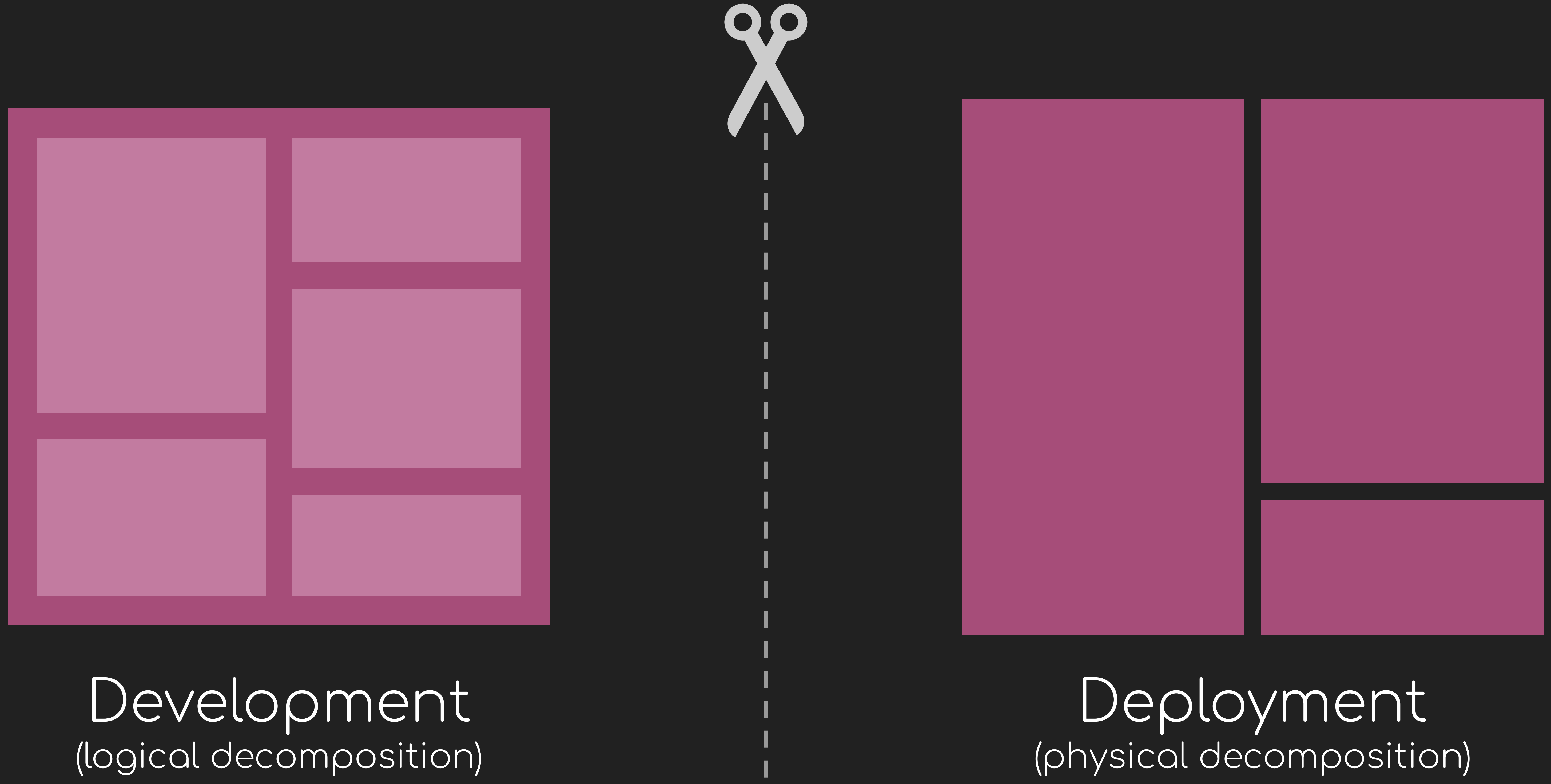
#5 Conclusions & considerations

#1

Motivation

& Goals

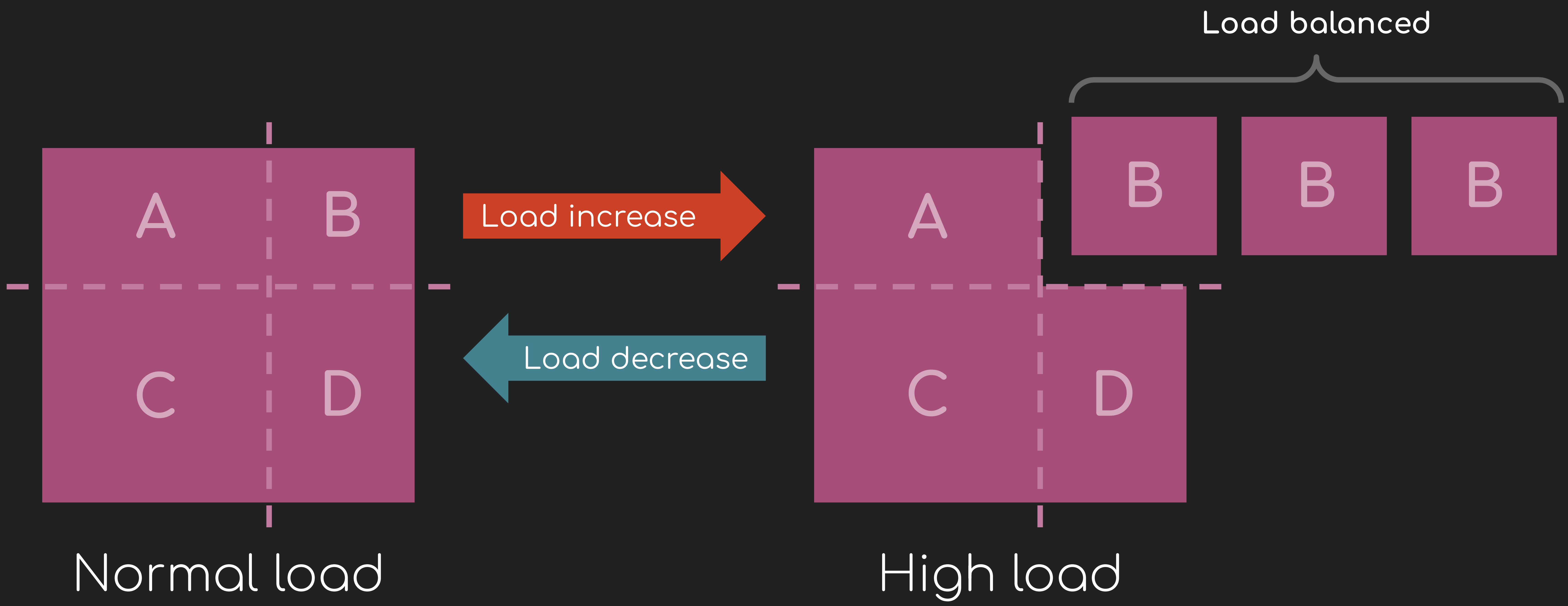
Freedom of deployment



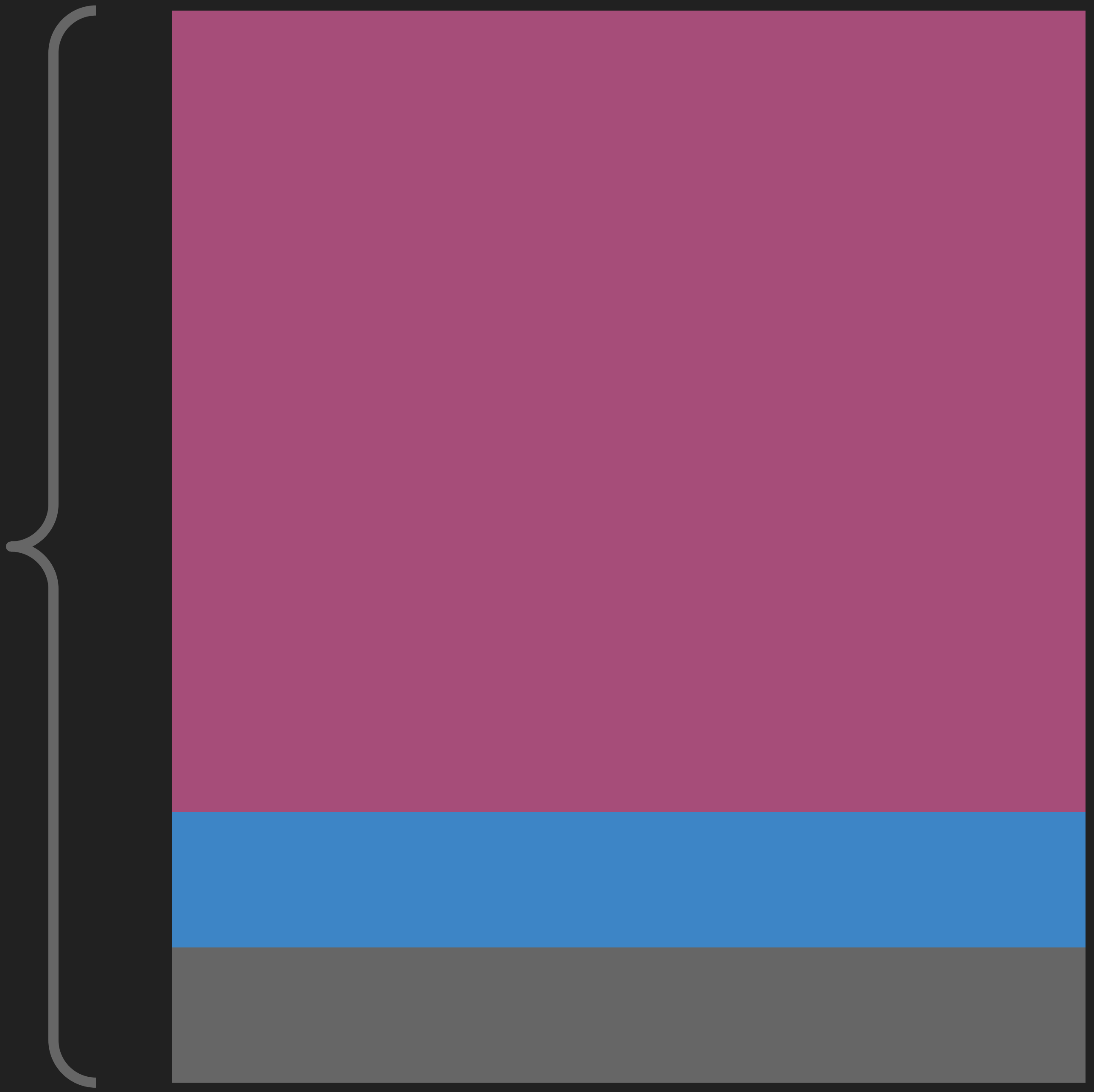
Development
(logical decomposition)

Deployment
(physical decomposition)

Optimal infrastructure use



Simplified overall development



▌ **Application**
Plain JavaScript without additional dependencies.

▌ **Runtime**
Handles distribution concerns for the application.

▌ **Platform**
Runs everywhere: web browser, cloud, container, etc.

#2

Splitting

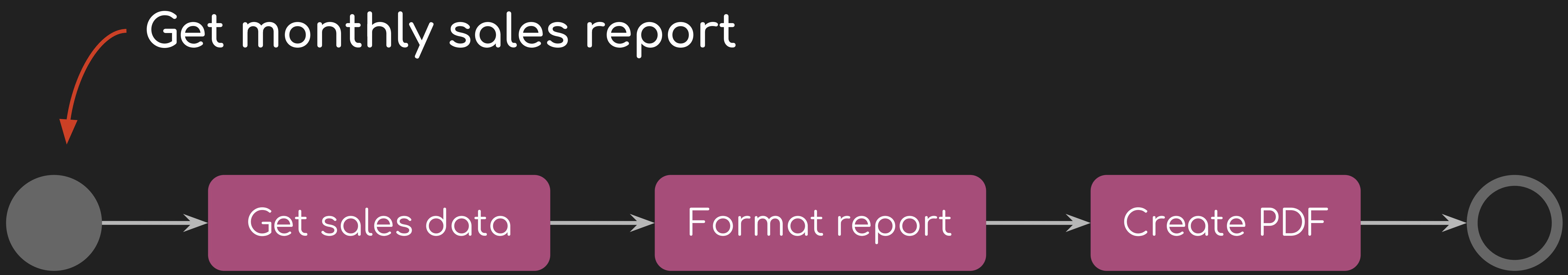
Applications

Prerequisites

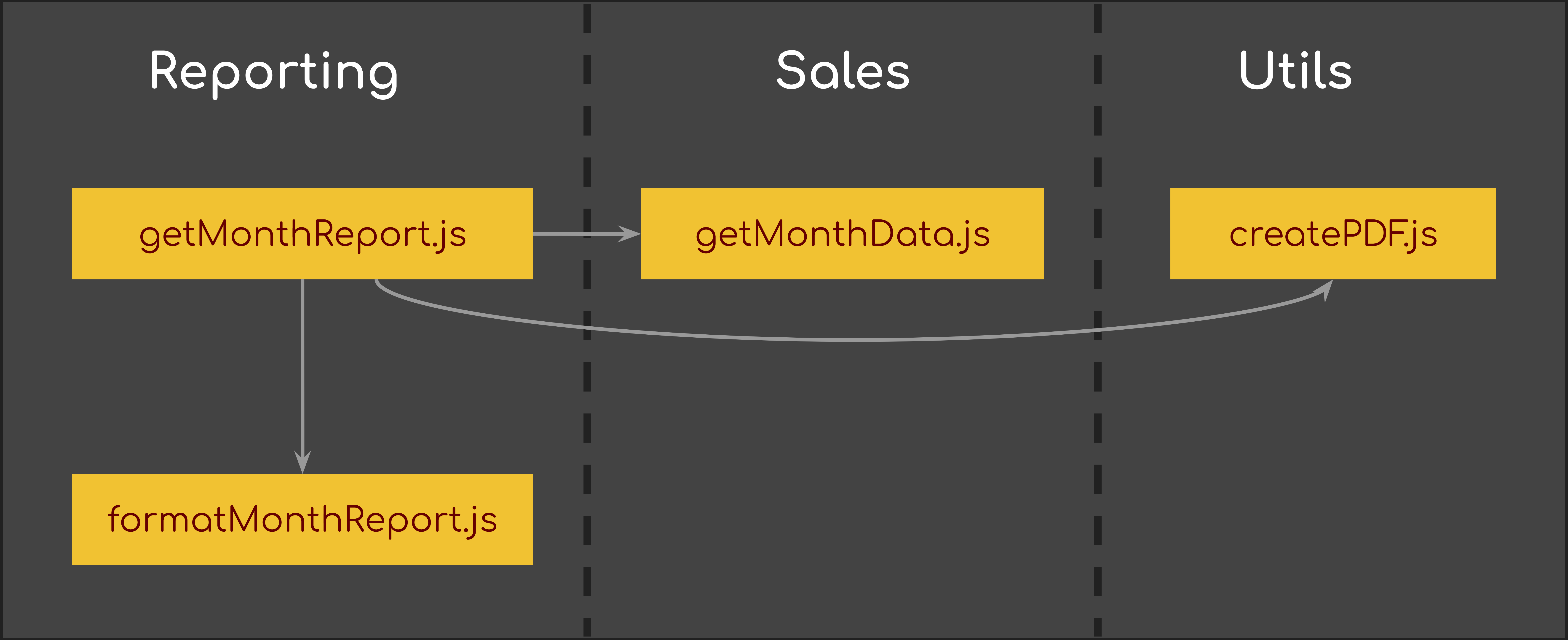
JavaScript
runtime

ECMAScript
modules

The application



Application structure

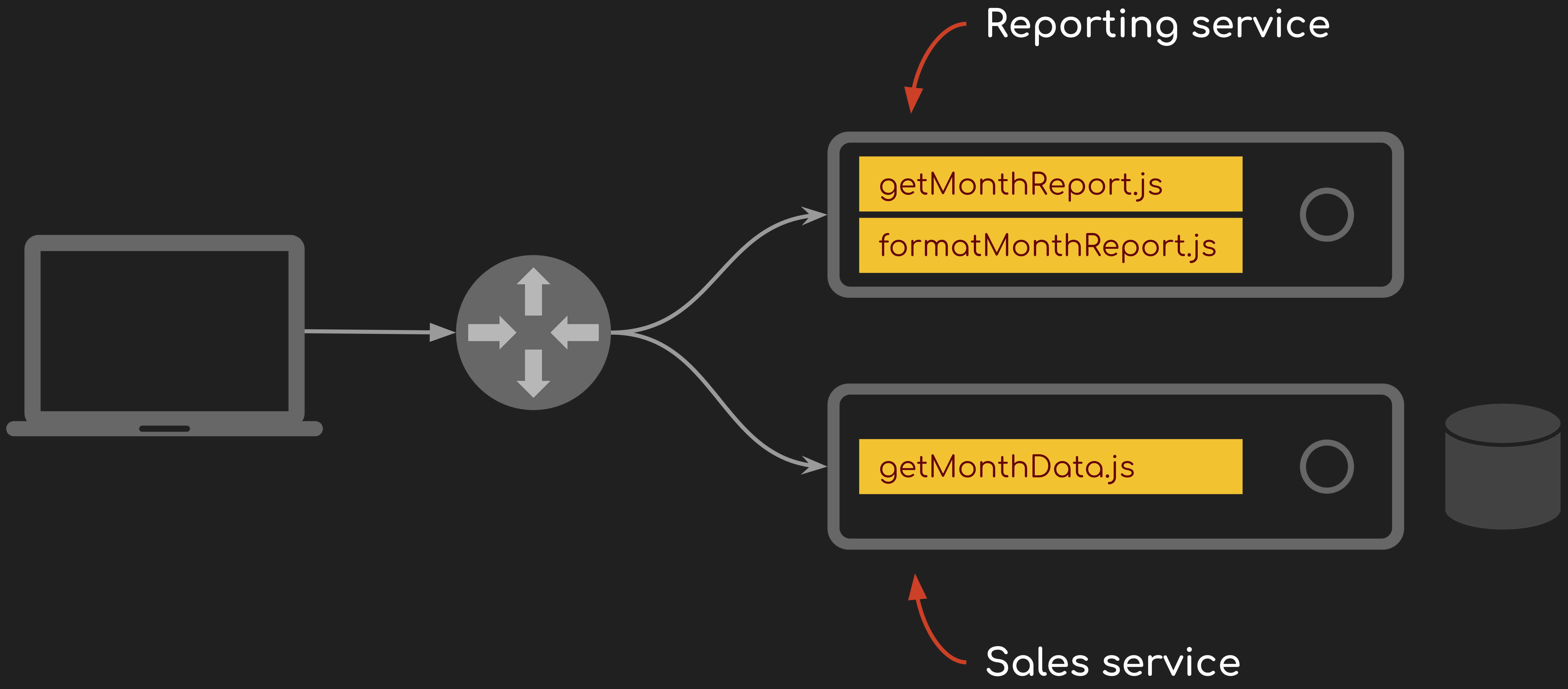


Process implementation

```
// reporting/getMonthReport.js

import createPDF from '../utils/createPDF.js';
import getMonthData from '../sales/getMonthData.js';
import formatMonthReport from './formatMonthReport.js';

export default async function getMonthReport(year, month)
{
  const data = await getMonthData(year, month);
  const report = await formatMonthReport(data);

  return createPDF(report);
}
```

Local imports

Distribution plan



Deployment configuration

```
// reporting.json
{
  "./reporting/getMonthReport.js": {
    "default": {
      "access": "public"
    }
  },
  "./reporting/formatMonthReport.js": {
    "default": {
      "access": "private"
    }
  }
}
```

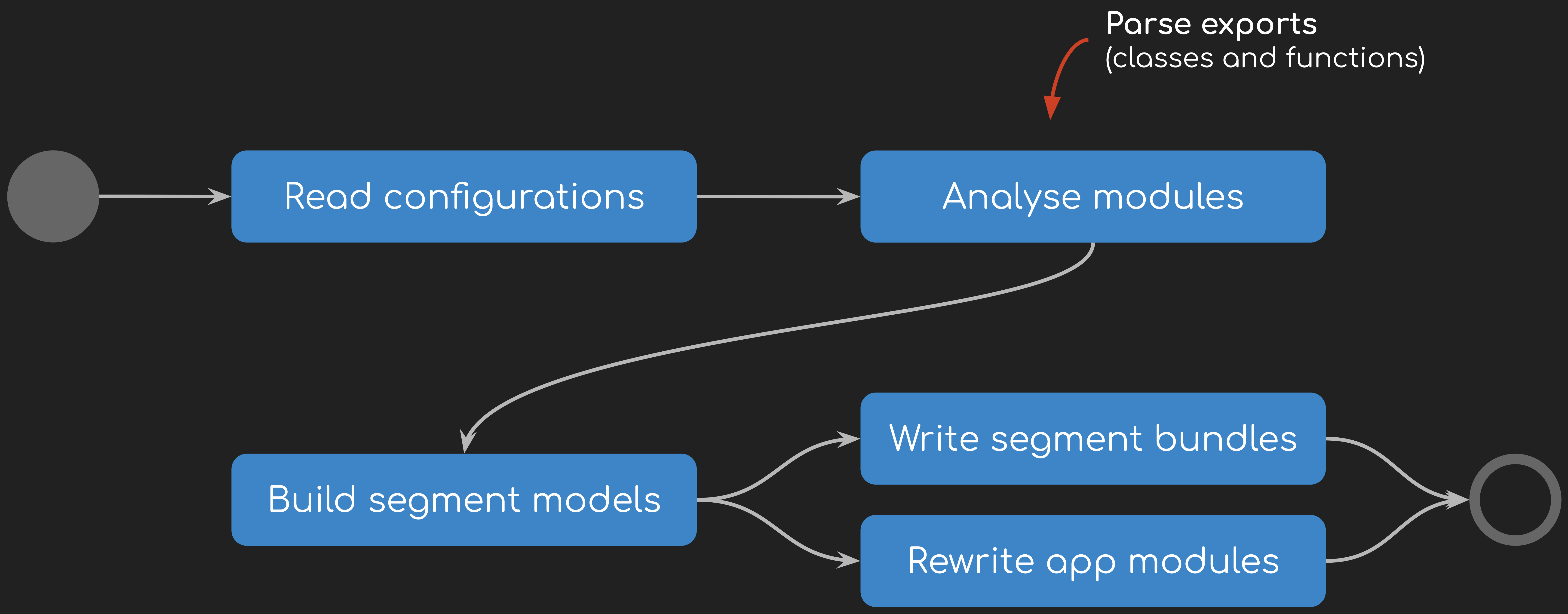
```
// sales.json
{
  "./sales/getMonthData.js": {
    "default": {
      "access": "protected"
    }
  }
}
```

$ jitar build

OUTPUT

```
[INFO] Built reporting segment (2 modules, 2 procedures, 0 classes)
[INFO] Built sales segment (1 modules, 1 procedure, 0 classes)
```

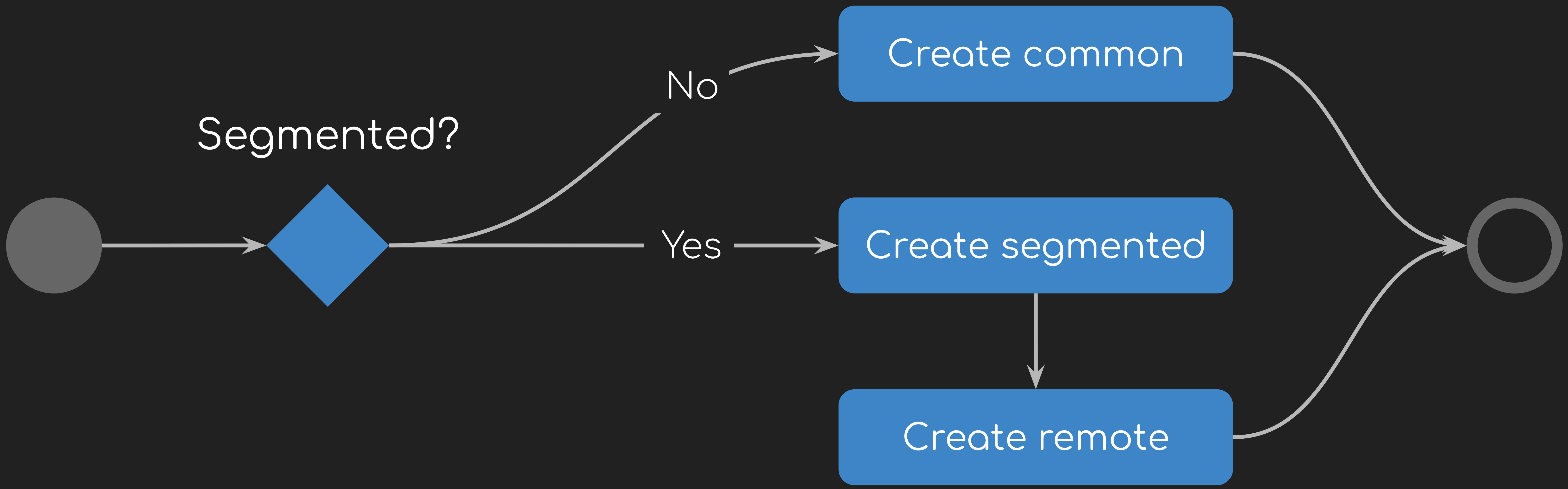
Build process



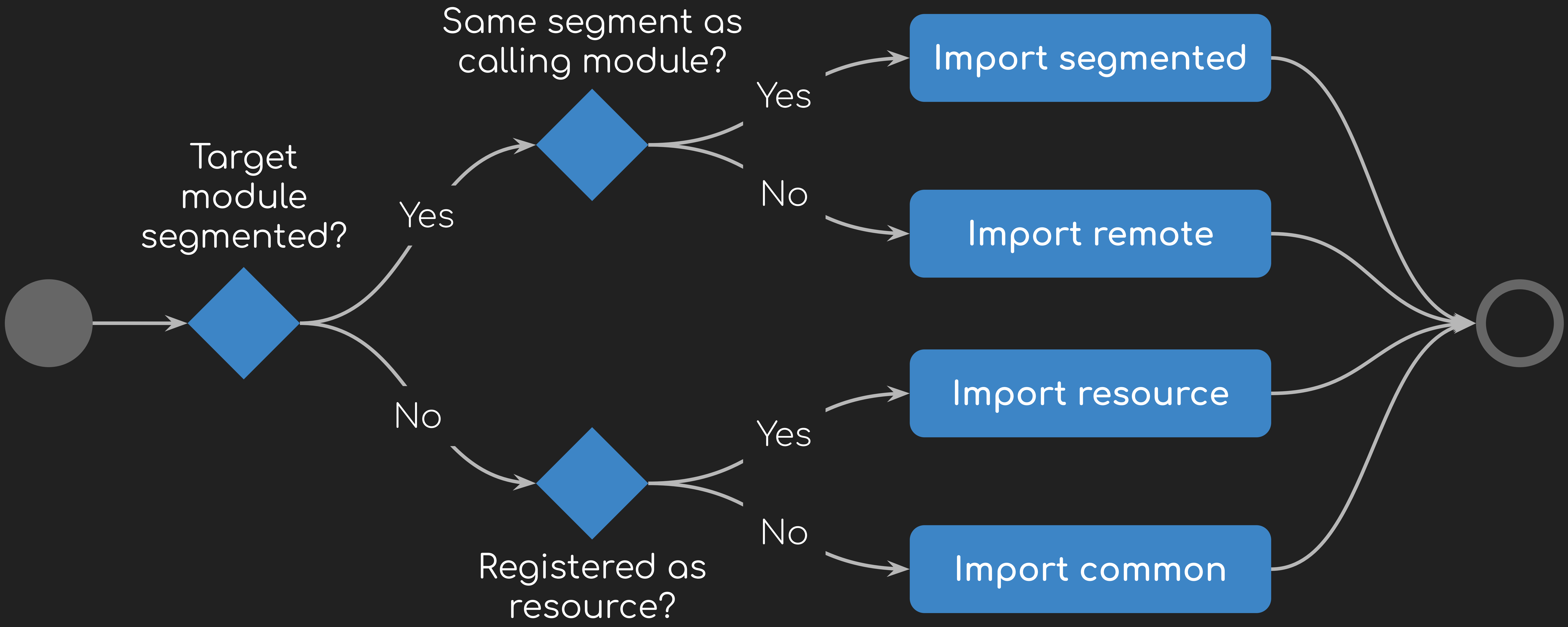
Segment bundle

```
import {Segment, Procedure, Implementation, Version, NamedParameter} from "jitar";
import $1 from "./reporting/getMonthReport.reporting.js";
import $2 from "./reporting/formatMonthReport.reporting.js";

                                                                 FQN
export default new Segment("reporting")
  .addProcedure(new Procedure("reporting/getMonthReport")
    .addImplementation(new Implementation(new Version(0, 0, 0), "public",
      [new NamedParameter("year", false), new NamedParameter("month", false)], $1))
    )
  .addProcedure(new Procedure("reporting/formatMonthReport")
    .addImplementation(new Implementation(new Version(0, 0, 0), "private",
      [new NamedParameter("data", false)], $2))
    )
```

App module rewriting



Import rewriting



Segmented module

```
// reporting/getMonthReport.reporting.js

import createPDF from '../utils/createPDF.js';
import getMonthData from "../sales/getMonthData.remote.js";
import formatMonthReport from "./formatMonthReport.reporting.js";

export default async function getMonthReport(year, month)
{
  const data = await getMonthData(year, month);
  const report = await formatMonthReport(data);

  return createPDF(report);
}
```

Replaced imports

Remote module

```
// sales/getMonthData.remote.js

export default async function getMonthData(year, month)
{
  return __run('sales/getMonthData', '0.0.0', {'year':year, 'month':month}, this);
}
```

FQN Version Args Context

#3

Running

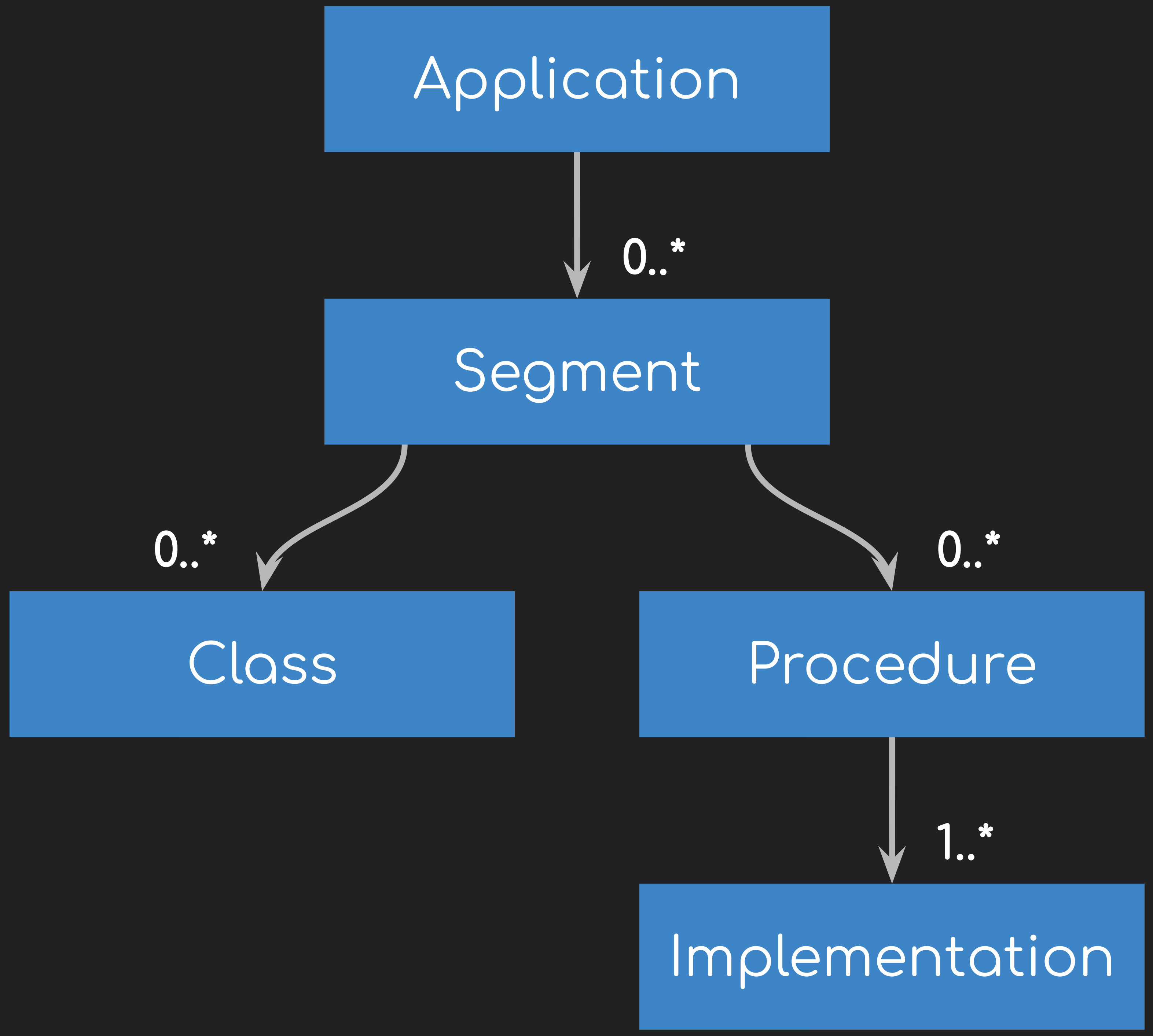
Applications

```
$ jitar start
--service=reporting.json
```

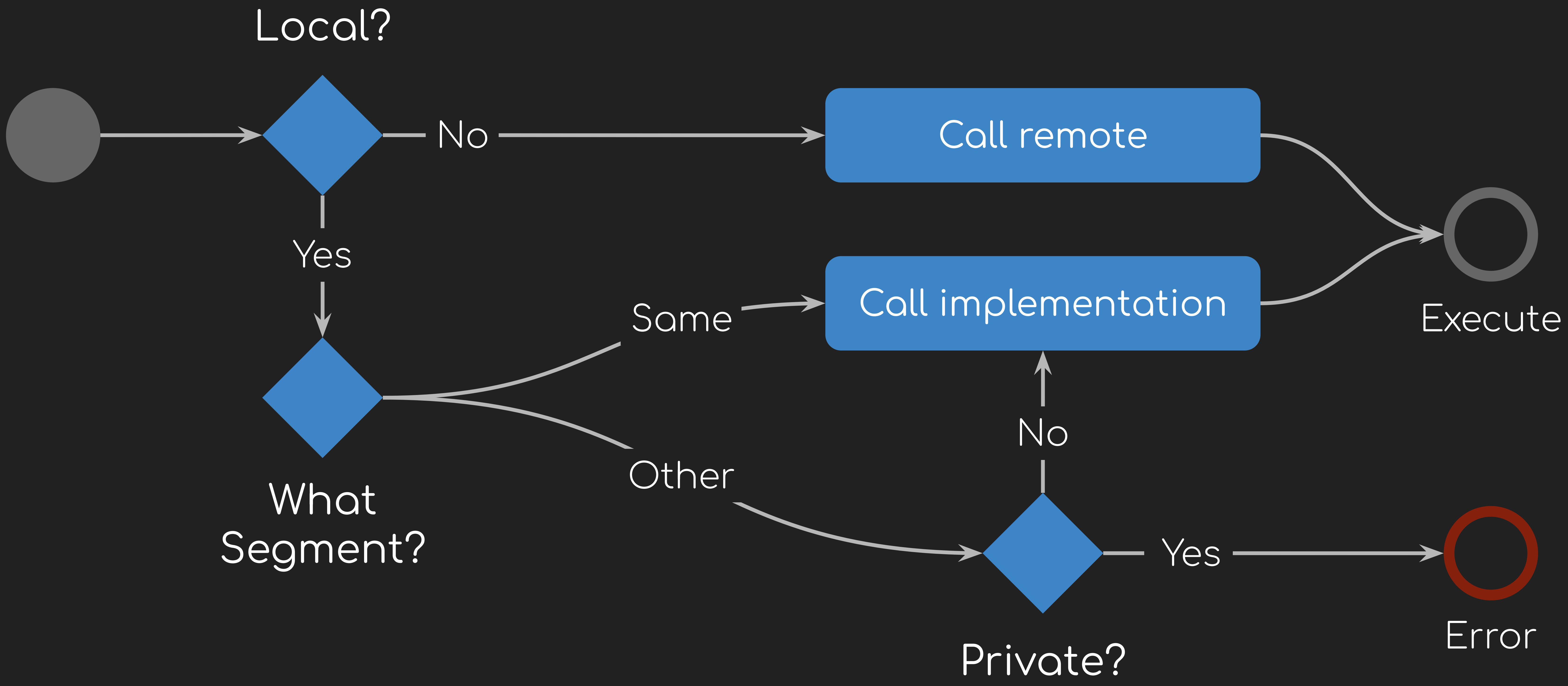
OUTPUT

```
[INFO] Server started at https://example.com:3000
[INFO] RPC procedures: [
  reporting/getMonthReport
]
```

Execution model



__run



Local?
No
Yes
Call remote
Call implementation
Execute
Same
Other
What Segment?
No
Yes
Private?
Error

RPC API

FQN

```
POST https://example.com/rpc/reporting/getMonthReport
content-type: application/json

{
  "year": 2025,
   "month": "April"
}
```

#4

Distributing

Applications

Requirements

Routing

Discovery

Interaction

Balancing

Monitoring

Security

Prevention

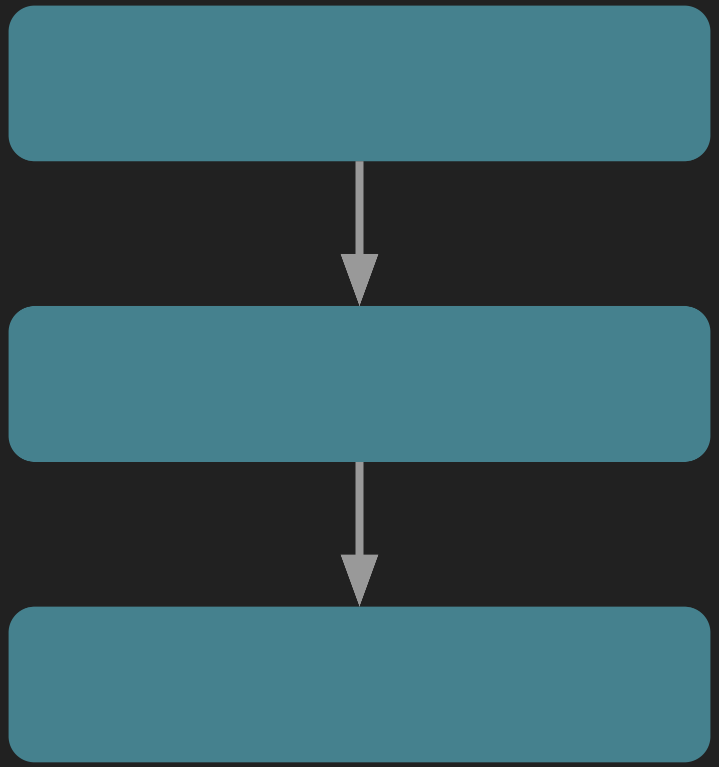
Tolerance

#5

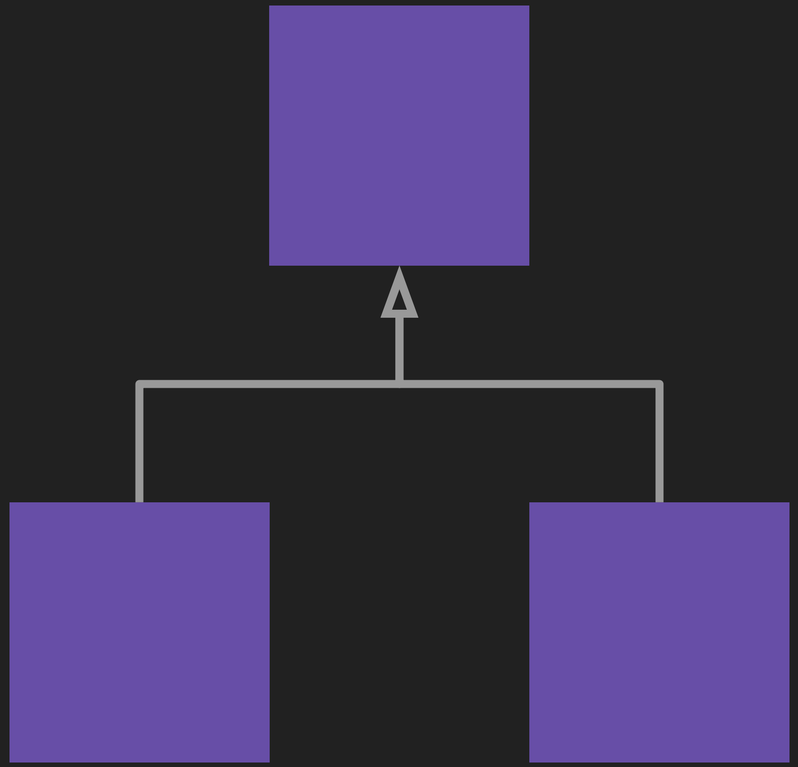
Conclusions

& Considerations

Programming paradigms

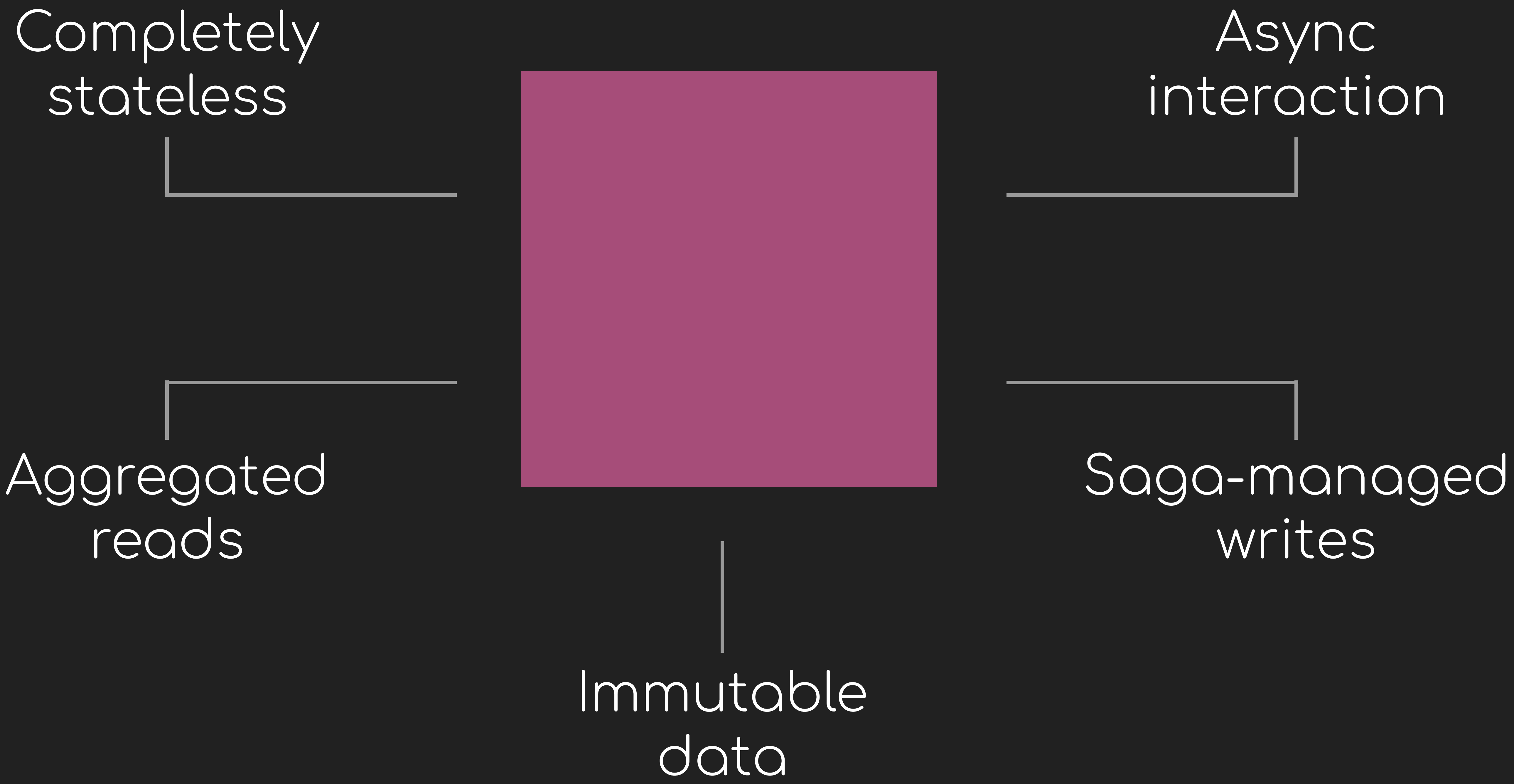


Procedural
(PRC)

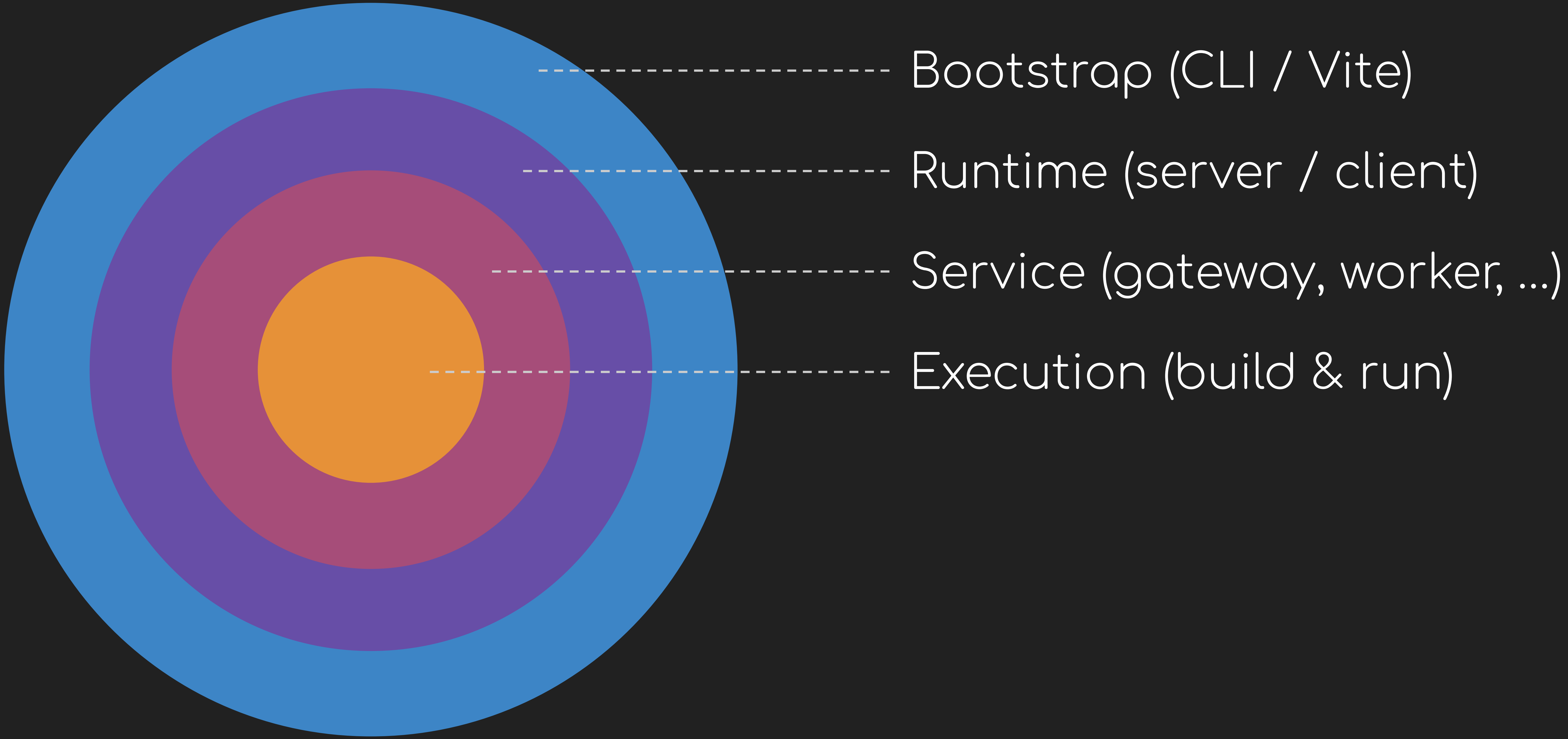


Object-oriented
(serialization)

Application constraints



Overall architecture



Thanks!

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