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The Design Space of Modern HTML5/JavaScript Web Applications

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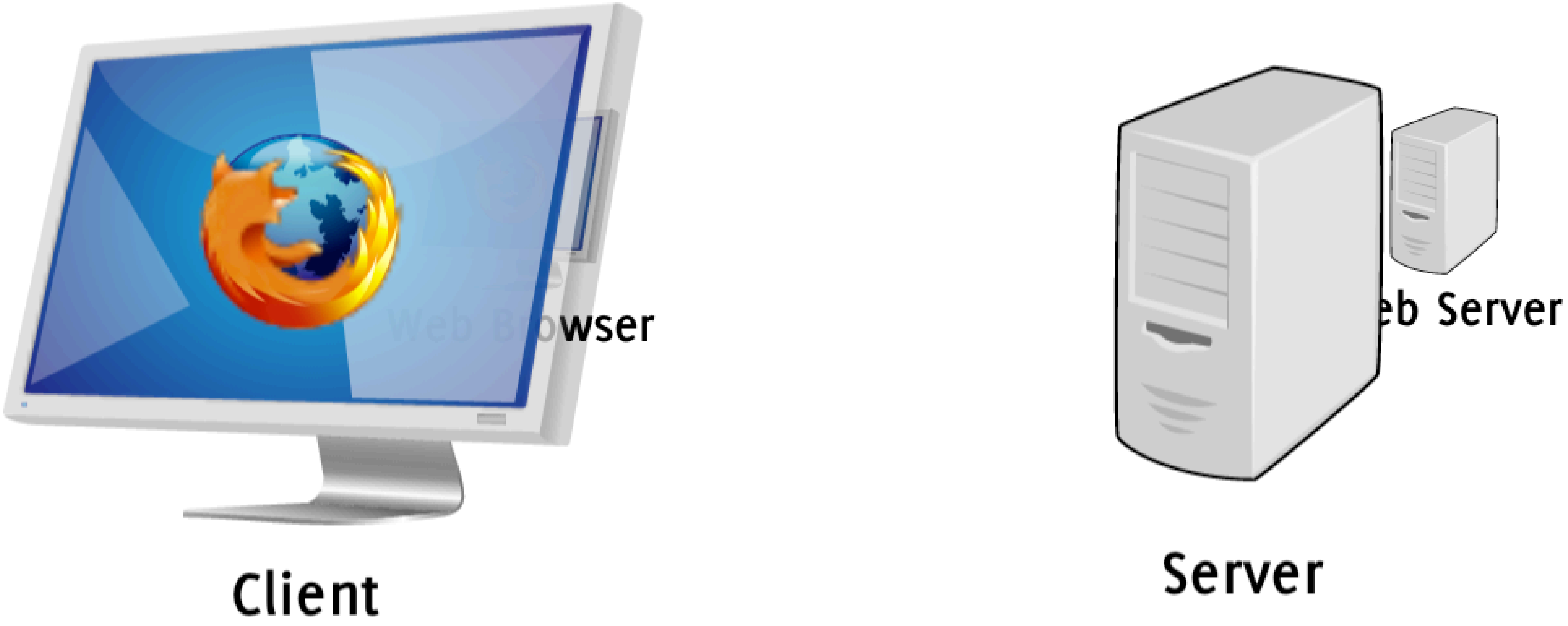
Web application Architecture



Web Browser

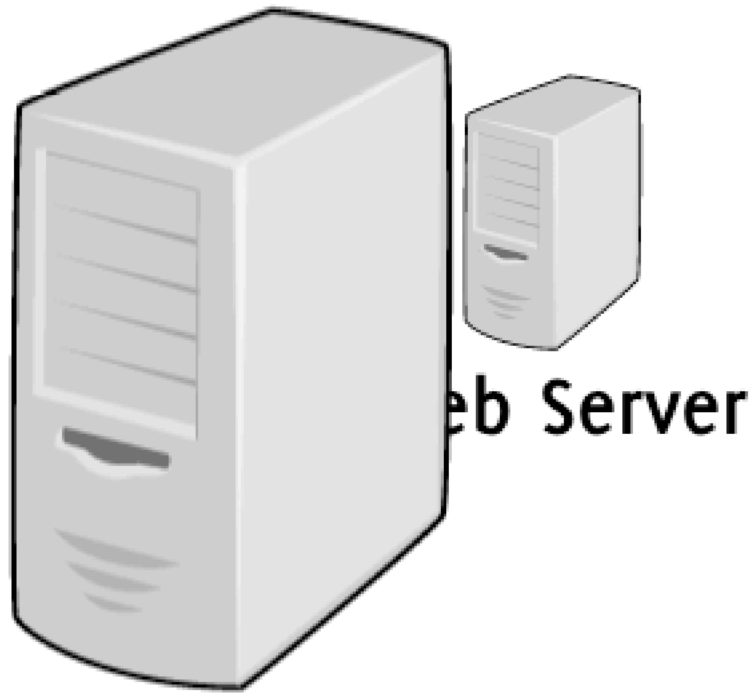
eb Server

Client

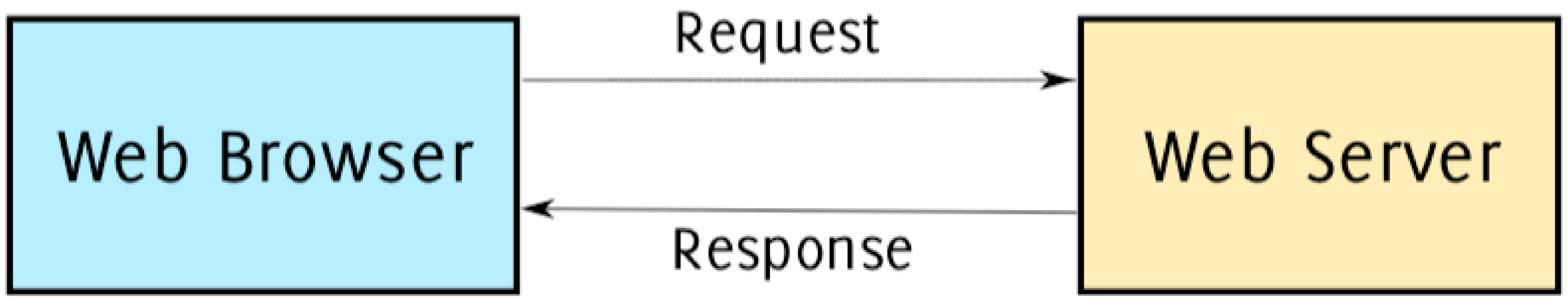
Server

Web application Architecture

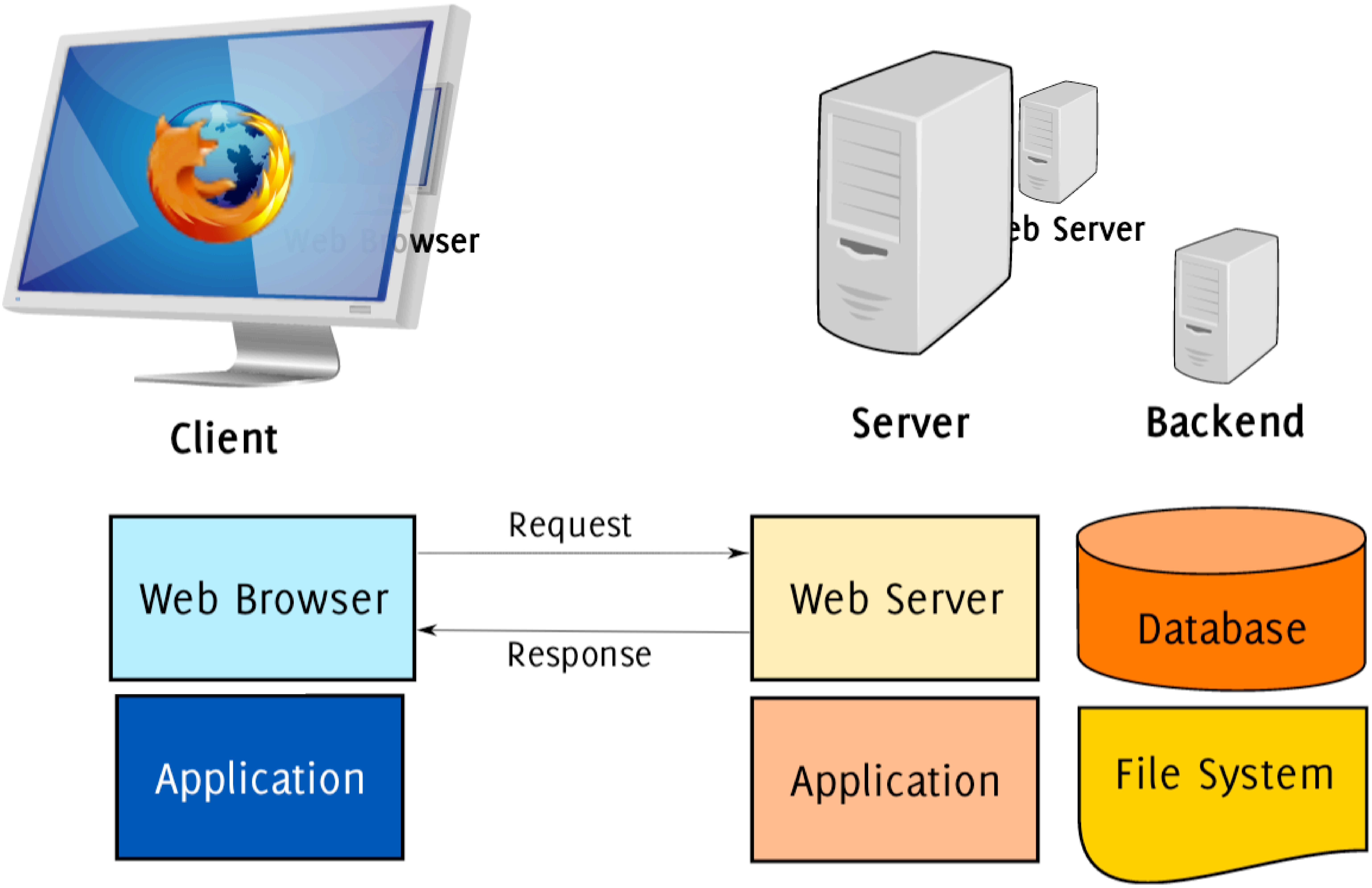
Client



Server



Web application Architecture



Client

Server

Backend

Web Browser

Request

Response

Web Server

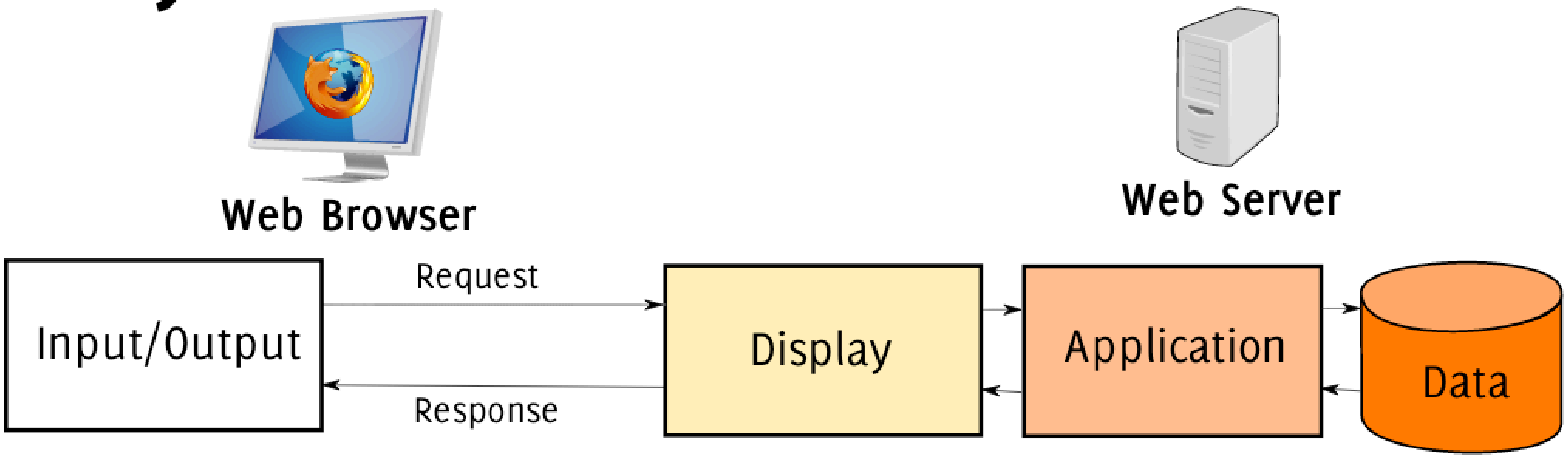
Database

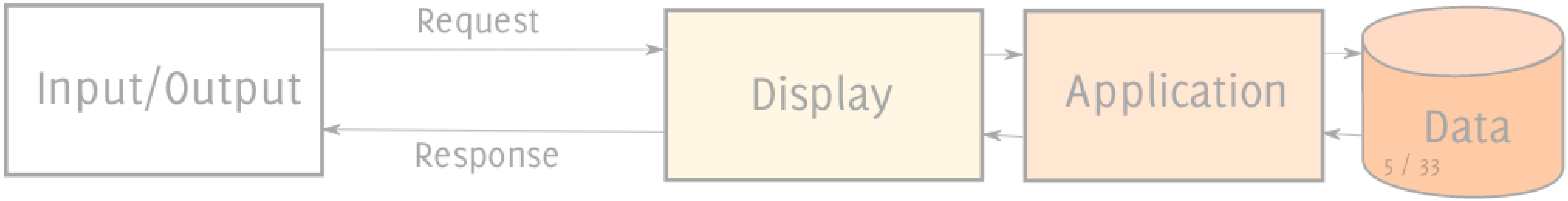
Application

Application

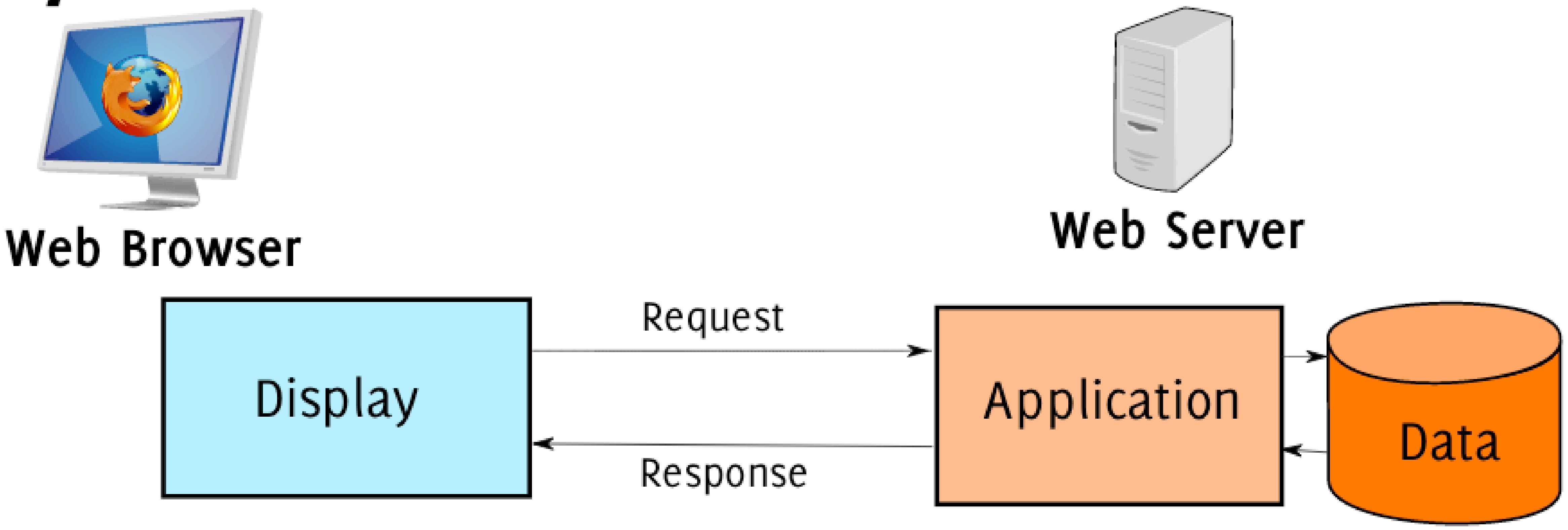
File System

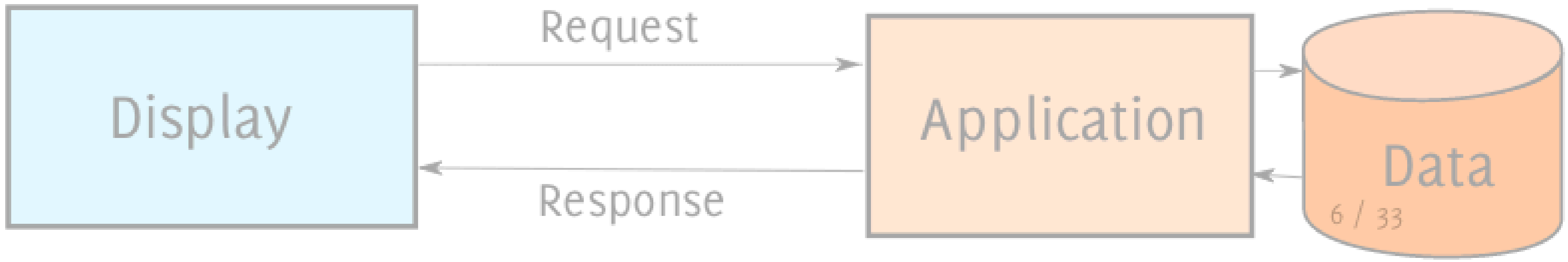
Very Thin Client



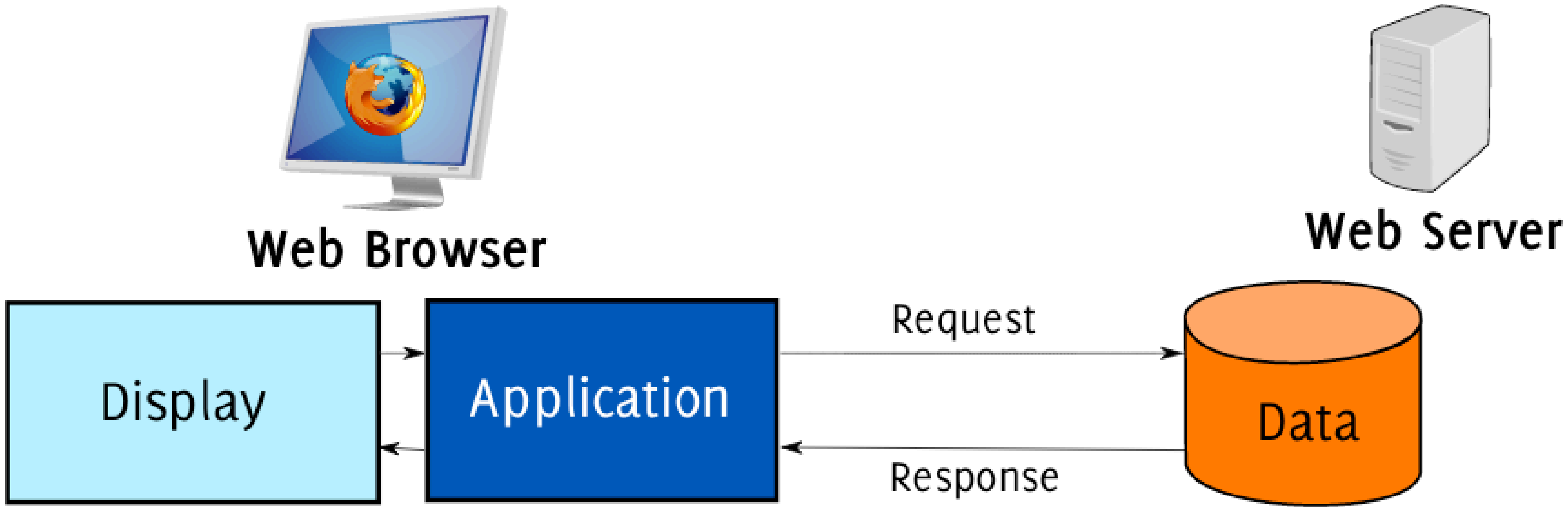


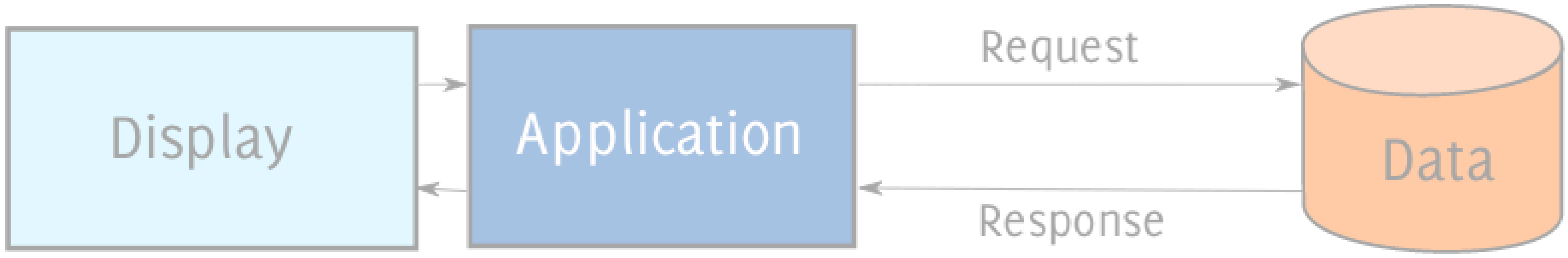
Client/Server



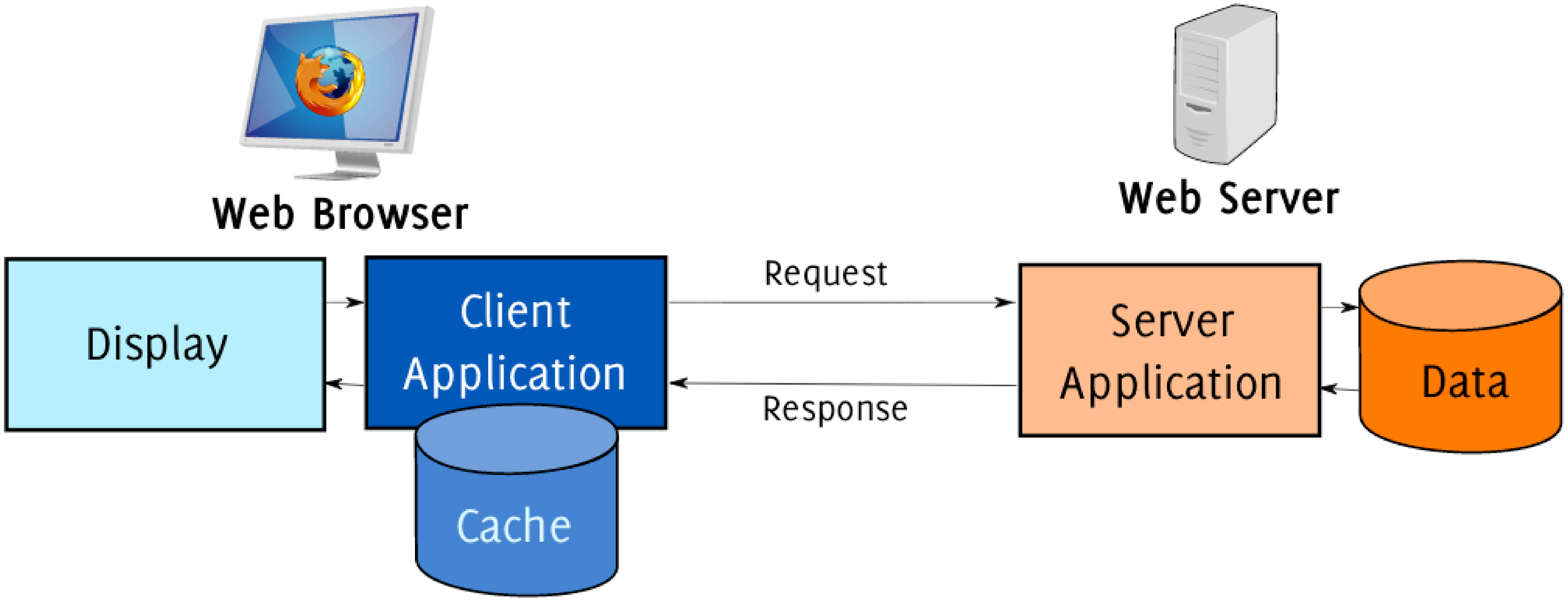

Display
Request
Response
Application
Data

Rich Client

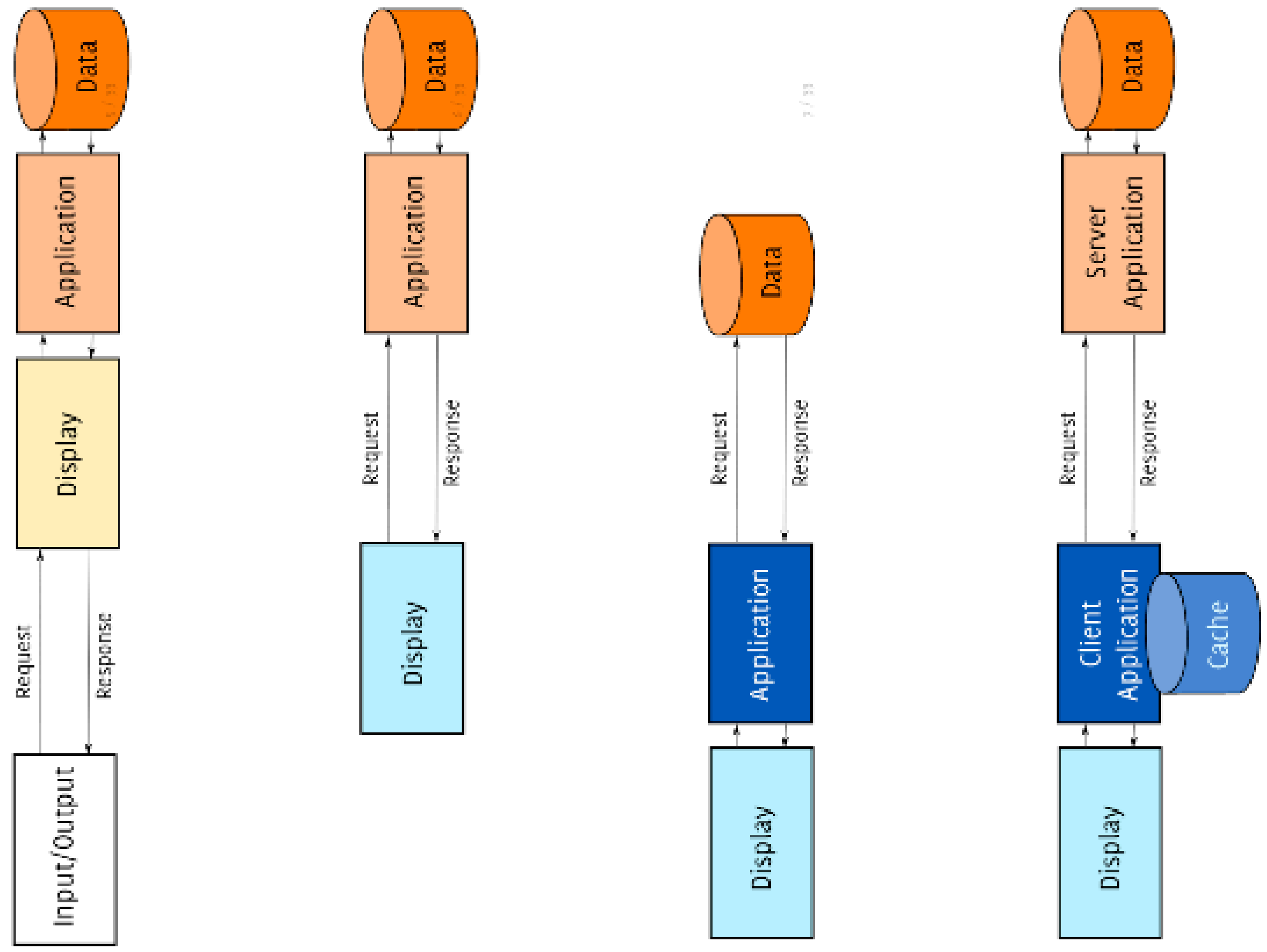

Web Browser
Web Server
Display
Application
Request
Response
Data



General Architecture

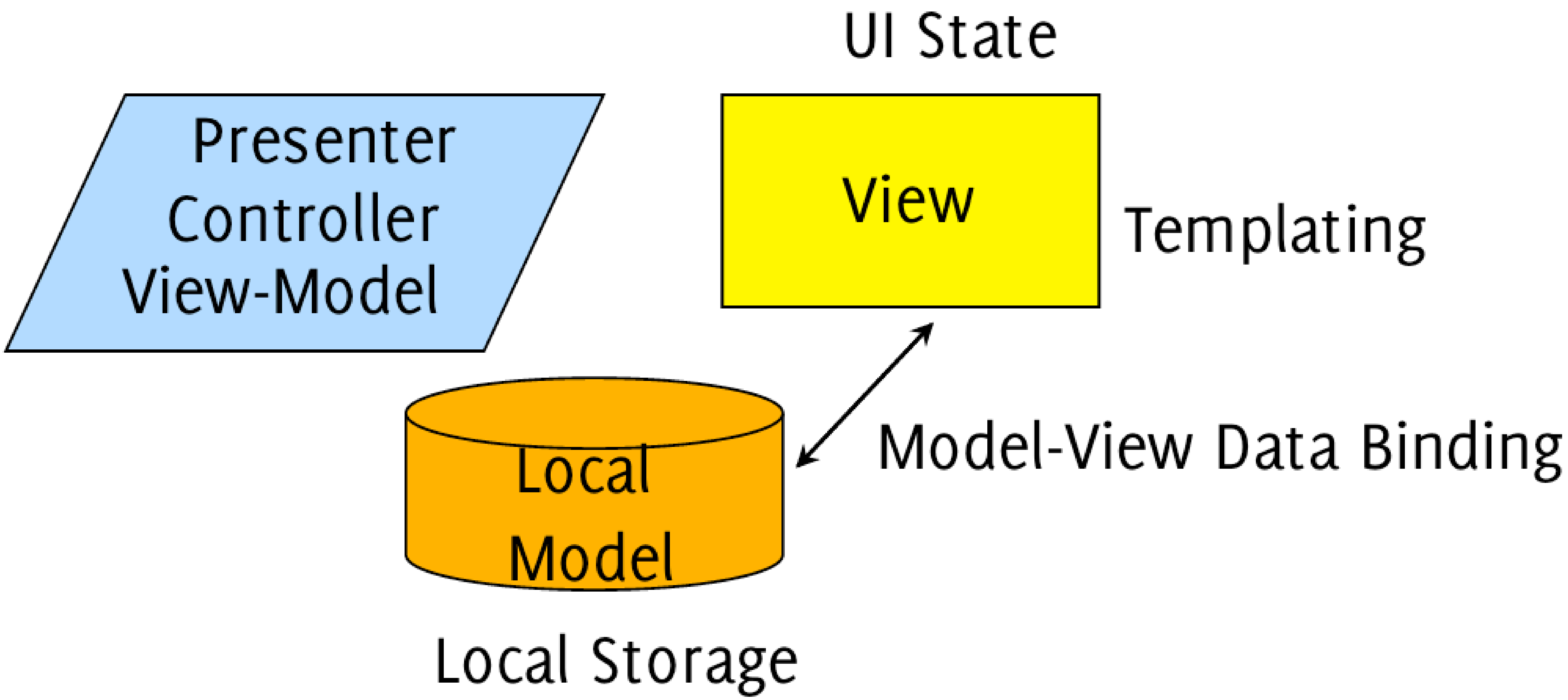


The server is a database



The browser is a terminal

Rich Client Web Application



UI State

Presenter
Controller
View-Model

View

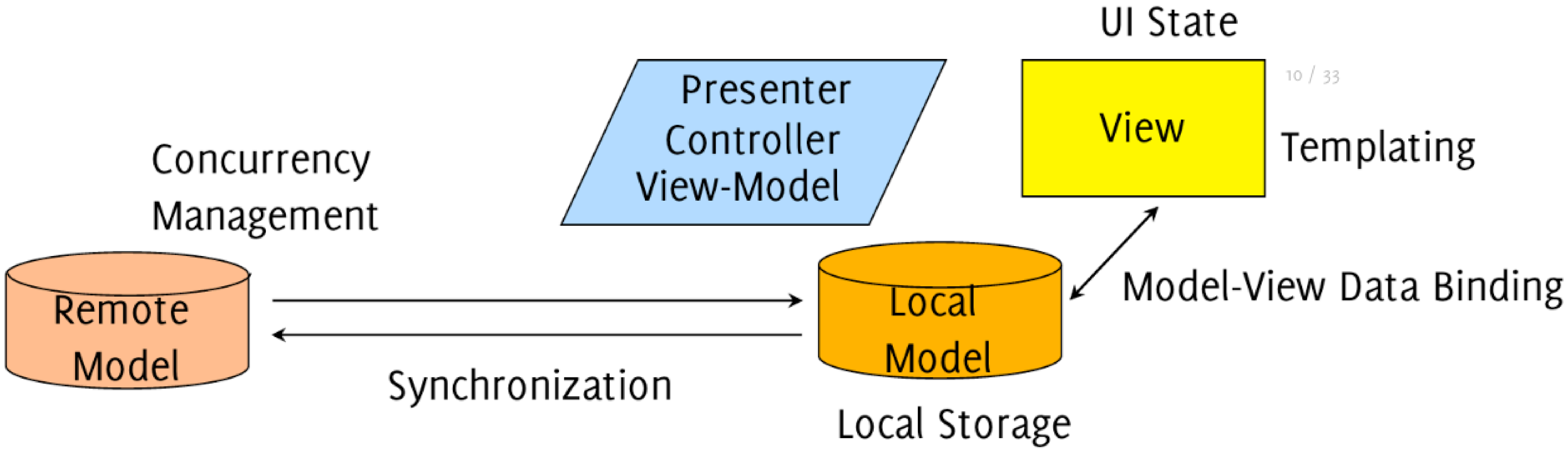
Templating

Local
Model

Model-View Data Binding

Local Storage

Rich Client Web Application



UI State

Presenter
Controller
View-Model

View

Templating

Concurrency
Management

Remote
Model

Synchronization

Local
Model

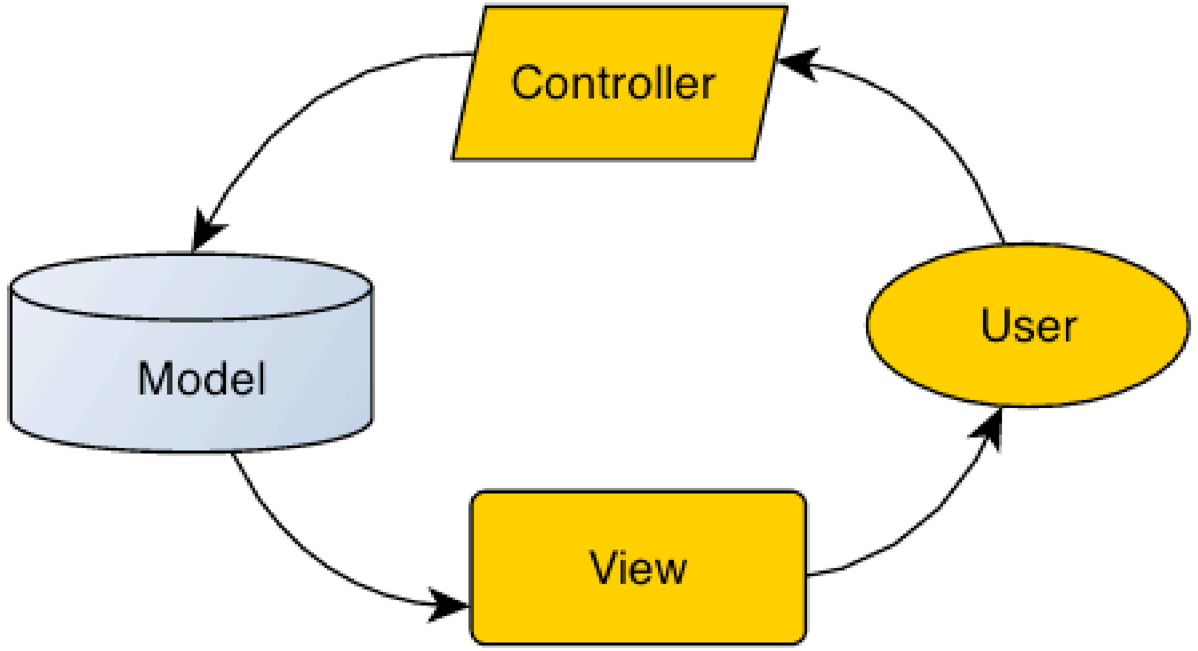
Local Storage

Model-View Data Binding

Model-View Interaction Pattern

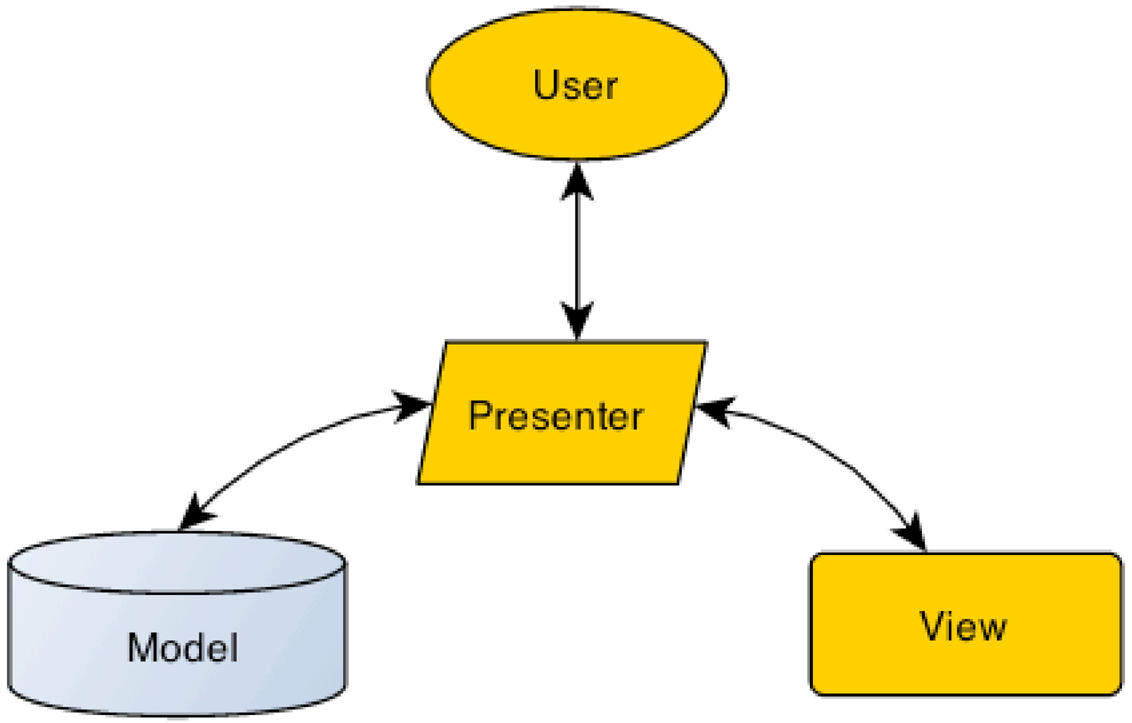
1. MVC - Model View Controller
2. MVP - Model View Presenter
3. MVVM - Model View View-Model
4. MV* - Model View (Whatever)

Model View Controller



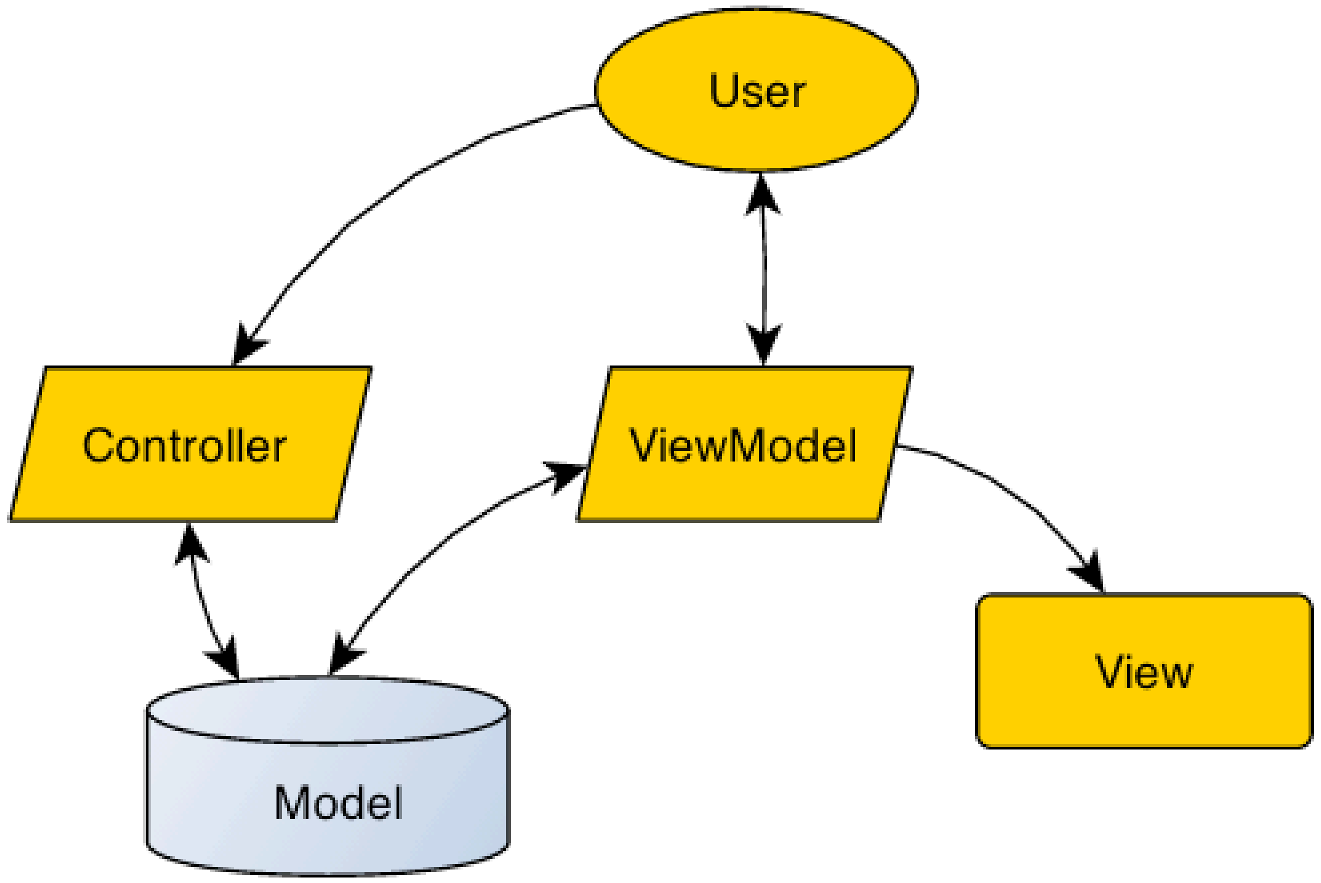
- Simple
- Direct mapping from model to view
- No view state

Model View Presenter



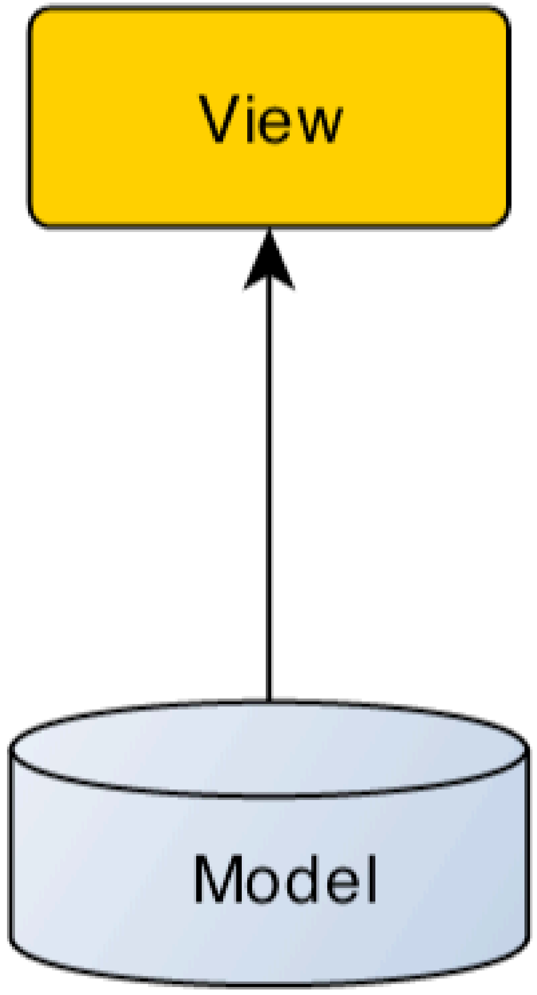
- More flexible
- Prone to Presenter overgrowth
- Simple view state

Model View ViewModel



- Most flexible
- Clean separation of view and controller logic
- Simple view state

Model View *



- Roll-your-own
- Good for power applications

Model-View Data Binding

Model (JS):

```
var model = new Person({
    name : "John",
    surname : "Smith",
    age : 123
})
```

View (DOM):

```
<div class="person">
    Name: <span id="name"></span><br/>
    Surname: <span id="surnamename"></span><br/>
    Age: <span id="age"></span>
</div>
```

Model-View Data Binding

1. No binding: full refresh required
2. Event-driven: explicit handlers of model changes (mono-directional)
3. Declarative: HTML5 `data-` attributes to bind models to view elements (bi-directional)

View Template Logic

Ensure separation of View and Presenter/Controller/View-Model layers

1. Templates with embedded logic (more expressive, hard to maintain)
2. Logic-less templates (faster)

View State Management

Identify and Persist the current state of the view

1. None (State is lost on refresh)
2. URL routing (# hash)
3. Event-based

Local state persistence

1. Cookies
2. Key-Value (HTML5 LocalStorage, SessionStorage)
3. SQL (WebSQL)
4. IndexedDB (Asynchronous)

Concurrency Management

1. None: Non-deterministic Collisions
2. Operational Transformation (share.js)
3. Locking (Explicit or Implicit)
4. Global Event Serialization (TeaTime)

More Decisions

1. Frameworks
   - MV* Framework
   - HTML Templating Mechanism
   - Eventing Framework
2. Development
   - Programming Language
   - Modularization
3. Portability
   - Target Browser Platform
   - Mobile Support
   - Feature Detection
   - Compatibility with Missing HTML5 Features

MV* Framework

Name	MV*	MVC	MVP	MVVM
Backbone	X			
Angular	X			
Spine		X		
Knockout				X
Knockback	X			
YUI		X	X	
Marionette				X
GWT		X	X	
Batman	X			

Template rendering engine

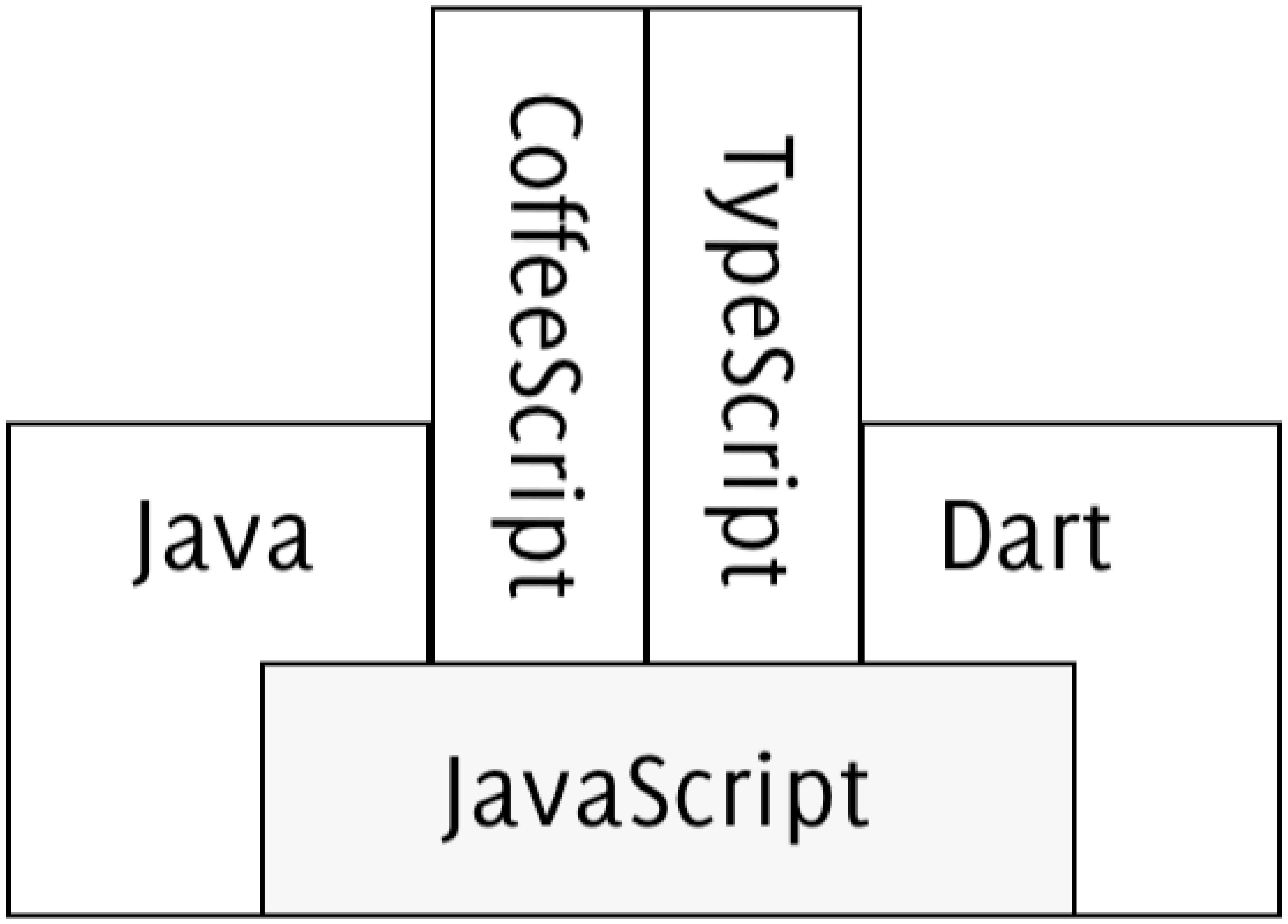
Name	Logic-enabled	Logic-less
Dom.js	x	
Dot.js	x	
EJS	x	
Handlebars	x	
Mustache.js	x	
Plates.js		x
Pure.js		x
Transparency		x
Underscore.js	x	

Event Delivery Method

Work around the limitations of HTTP

1. Polling
2. COMET (streaming and long polling)
3. HTML5 WebSockets, Server-Sent Events
4. SPDY

Programming Language



Modularity

1. None
2. RequireJS
3. Marionette
4. Browserify

Target Browser Platform

1. Google Chrome
2. Microsoft Internet Explorer
3. Mozilla Firefox
4. Apple Safari
5. Opera
6. Amazon Silk

Mobile Support

1. Responsive Design
2. CSS Media queries
3. jQuery mobile

Feature Detection

1. modernizr
2. user agent-string
3. Cutting the Mustard

Compatibility with Missing HTML5 Features

1. CSS
2. Embedded Foreign Browser Frame
3. HTML5 shivs and shims (JavaScript backport)

Conclusion

- There are many emerging frameworks for building rich client applications with HTML5/JavaScript
- Many architectural decisions are required to design rich client applications
- Come and visit the Software Architecture Warehouse http://demo.saw.sonyx.net/ if you would like to make some of those decisions together