Intro to Grails

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About Me

- Principal Consultant at Object Partners, Inc.
- Grails 4 years
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Object Partners, Inc.

- Groovy, Java, mobile, open source
- Founded 1996
- ~100 senior consultants
  - Minneapolis, Omaha, Chicago, Denver
  - Average tenure >5 years

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What is Grails?

Spring MVC + Hibernate + Groovy

Dependency management + CLI + build system

Plugin system w/ 1000+ plugins

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Running on JVM

- Reuse your existing Java code
- Leverage vast ecosystem of Java libraries
- Deploy to app servers such as Tomcat, etc.

Convention over Configuration

- Sensible defaults
- Minimal annotations
- No XML required

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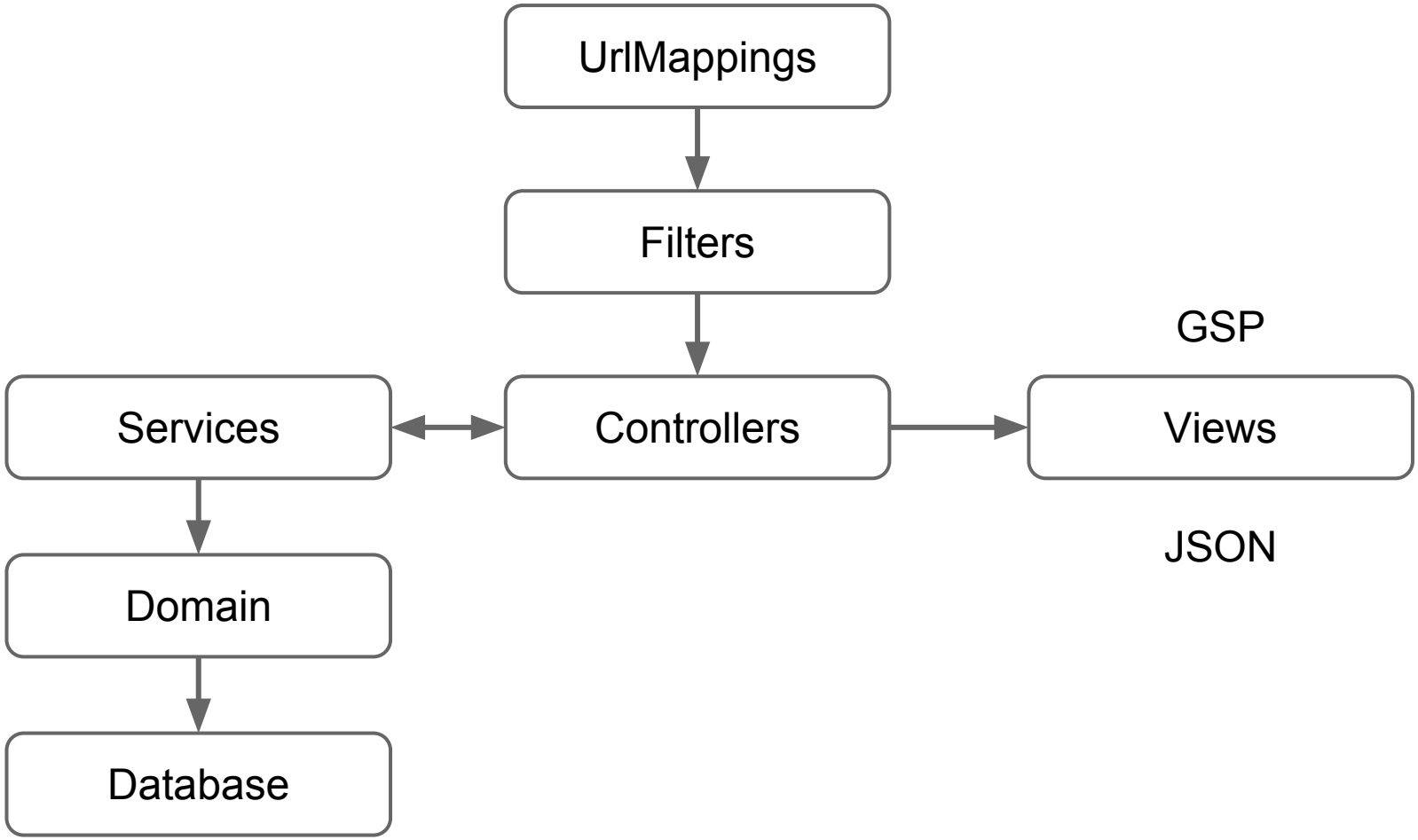

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Our First Grails app

```
> grails create-app <app-name>
```

```
> grails create-app grails-intro
```

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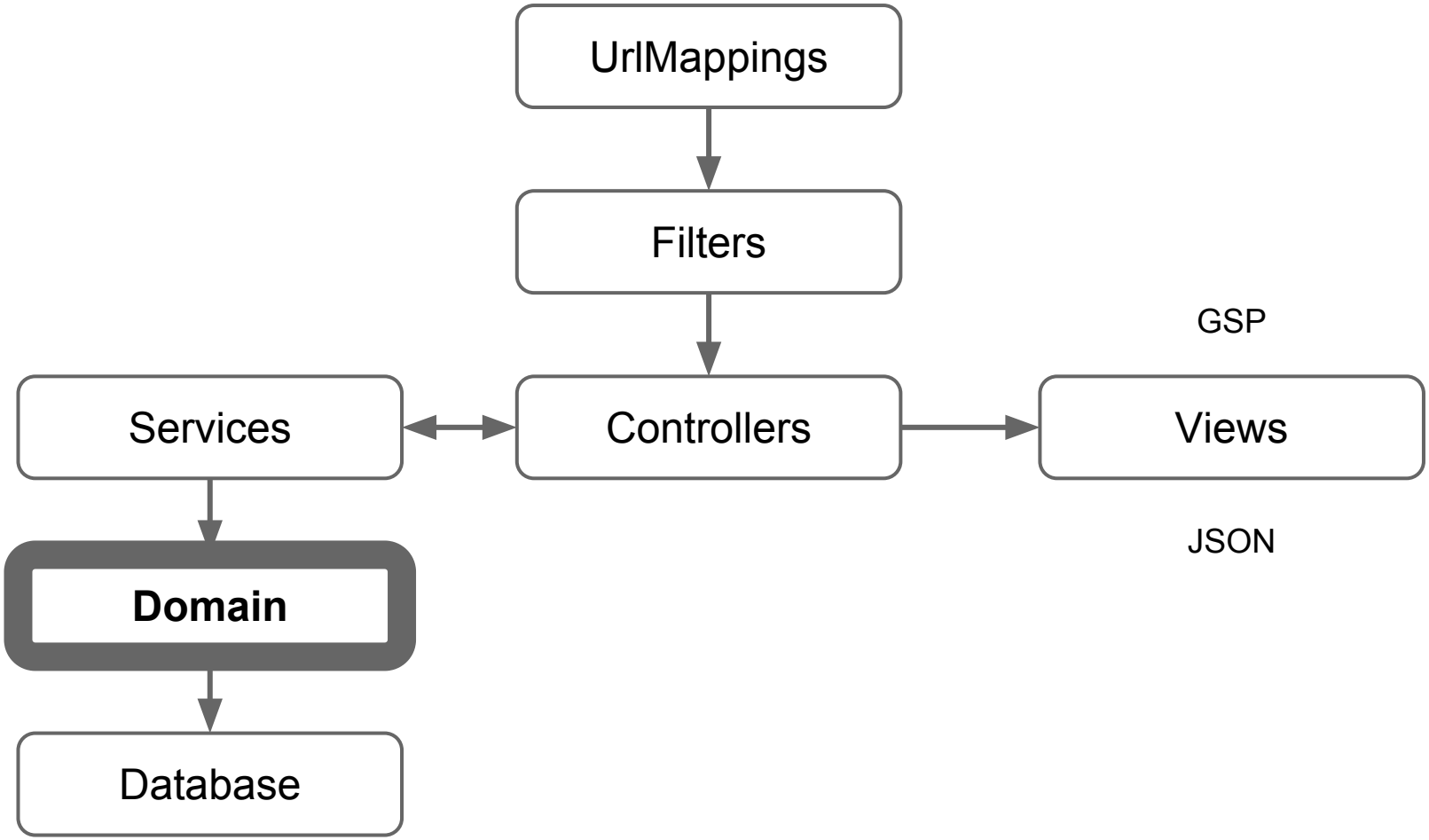

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Domain

- Grails Object Relational Mapper (GORM)
- Sensible conventions for table & column mapping
  - Can override for legacy schemas

```
> grails create-domain-class Person
```

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Domain Class

```
class Person {
  String firstName
  String middleName
  String lastName

  static constraints = {
    firstName(nullable: false, blank: false)
    middleName(nullable: true)
    lastName(nullable: false, blank: false)
  }
}
```

Creating Domain Instance

```
Person newPerson = new Person(
  firstName: 'Jim',
  lastName: 'Smith'
)
newPerson.save()
```

```
Person invalidPerson = new Person(
  firstName: 'Jim'
)
assert !invalidPerson.validate() // no last name
```

GORM Methods

```
.save()
.get(id)
.list()
.delete()
.count()
.validate()

// and many more
```

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Domain Object Relationships

- One-one = domain class field
  - Address address
- One-many
  - static hasMany = [addresses: Address]
  - static belongsTo = [person: Person]

```
class Address {
  String street
  String city
  String state
  String postalCode
}
```

```
class Person {
  Address address

  String firstName
  String middleName
  String lastName
  Integer age
}
```

Multiple Addresses

```
class Person {
  static hasMany = [addresses: Address]

  String firstName
  String middleName
  String lastName
  Integer age
}
```

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Mapping to Existing Databases

- Customize table & column mappings

```
class User {
  String username

  static mapping = {
    table 'app_user'
    username column: 'user_name'
  }
}
```

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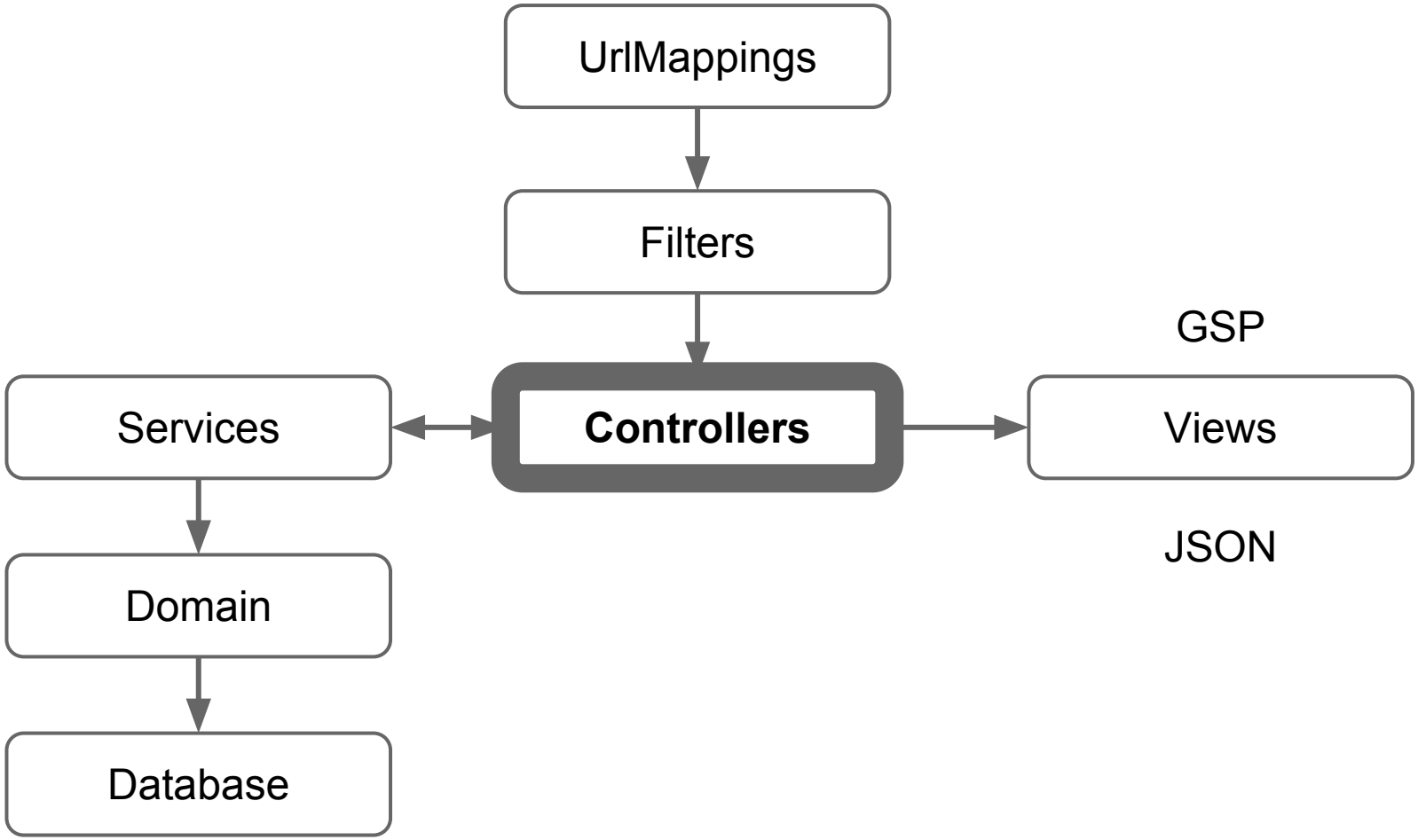

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Controllers

1. Parse input

   Query parameters, form submission, JSON, etc.

2. Delegate to services

   Business logic, database access, etc.

3. Render response

   GSP, JSON, etc.

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Controller Actions

- Controllers contain one or more actions
- Actions are any public method in controller

URL Convention

/controller/action

```
class UserController {
  def signup() {
    ...
  }
}
```

/user/signup

URL Mappings

grails-app/conf/UrlMappings.groovy

```
class UrlMappings {

  static mappings = {
    "/$controller/$action?/$id?(.$format)?"

    "/"(view:"/index")
    "500"(view:'/error')
  }
}
```

ID in URL

/controller/action/id

```
class PersonController {
  def show(Long id) {
    ...
  }
}
```

/person/show/1

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Parameter Data Binding

- Access request data in actions
- Same action code handles different types of requests
  - URL query parameters
  - Form submissions
  - API call (JSON or XML)

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Typed Action Arguments

- Automatic conversion to boolean, number, date, etc.
- Even automatically load domain object from database

```
class ReportController {
  def createReport(String title, Boolean editable) {
    ...
  }

  def viewReport(Report report) {
    // Param name is 'report.id'
    ...
  }
}
```

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Command Object

- Action method arguments can become unwieldy when many parameters
- Command object is class with fields for each parameter
- Supports server-side parameter validation

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```
class ReportController {
  def createReport(NewReportCommand cmd) {
    ...
  }
}

class NewReportCommand {
  String title
  String content
  String owner
  Boolean editable
  ReportStatus status // Can also bind Enums
}
```

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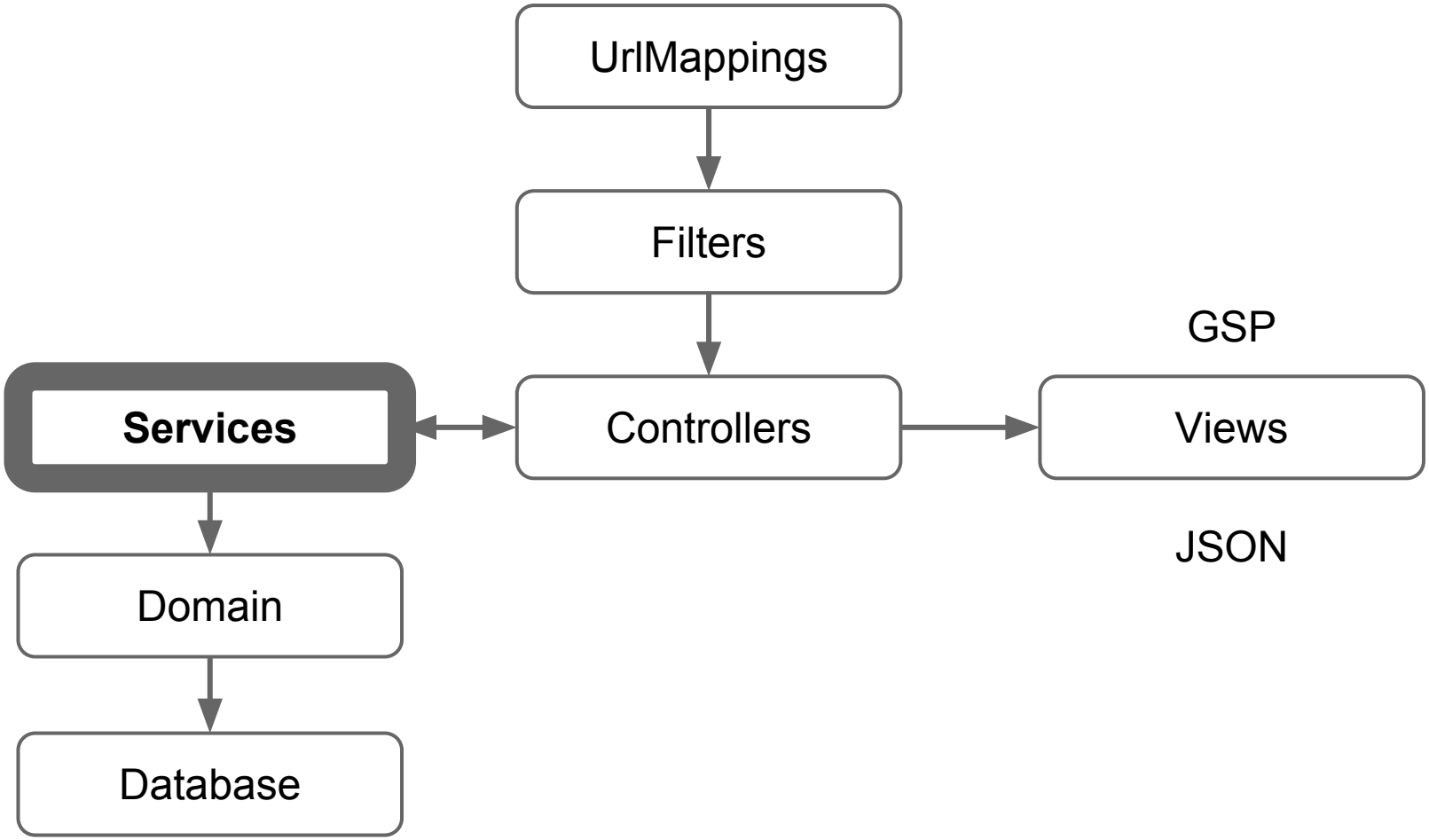

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Services

- All classes under grails-app/services
  - Automatically available for dependency injection
- Business logic
- Transactional database access

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Database Queries

- Dynamic finders
- ‘where’ queries
- Criteria queries
- Hibernate Query Language (HQL)
- SQL

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Dynamic Finders

- Automatically created for all one and two field combinations

```
Person.findByFirstName("Jim")

Person.findByFirstNameAndLastName("Jim", "Smith")

Person.findAllByLastName("Smith")
```

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Criteria Queries

Groovy DSL for Hibernate criteria queries

```
Person.withCriteria {
    eq('lastName', personLastName)

    address {
        eq('city', cityName)
    }
}
```

‘where’ Queries

Queries written with standard Groovy code

```
Person.where {
    lastName == 'Smith' &&
    address.city == 'St. Paul' &&
    age > 35
}.list()
```

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Hibernate Query Language (HQL)

- SQL-like syntax
- Automatically converts results to domain objects

```
Person.executeQuery("select person from Person person \
    inner join person.address as address \
    where person.age > 35 and \
      person.lastName = 'Smith' and
      address.city = 'St. Paul'")
```

Raw SQL

```
def sessionFactory // Injected by Grails

List<String> findLastNamesWithAge(Integer age) {
  def currentSession = sessionFactory.currentSession

  def sqlQuery = currentSession.createSQLQuery(
    "select p.last_name from person p where p.age = :age")

  sqlQuery.setInteger('age', age)

  return sqlQuery.list()
}
```

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Services Automatically Injected

- Available in controllers, filters, taglibs, other services
- Injected by camelCase class name

```
class UserController {
  def userService // Not typed
  // or
  AdminService adminService // Typed service
}
```

Inject Other Classes

grails-app/conf/spring/resources.groovy

```
beans = {
  beanName(BeanClass)
}
```

```
class MyController {
  BeanClass beanName
}
```

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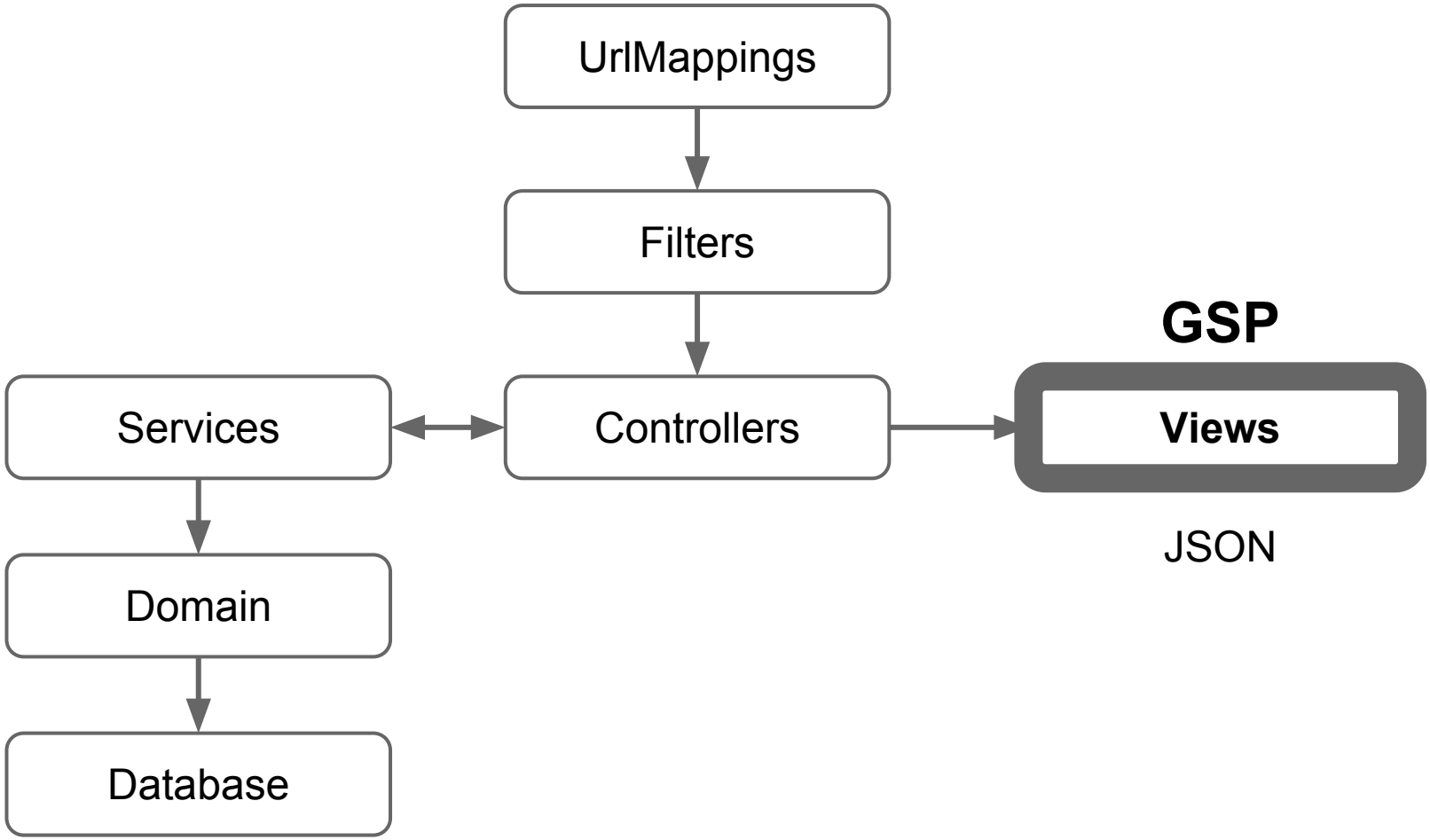


Groovy Server Page (GSP)

- Dynamically generate HTML
- Combine markup with data and code to render HTML back to browser

```
<div>
  <h3>${sectionHeading}</h3>

  <p>${sectionContent}</p>
</div>
```

Templates

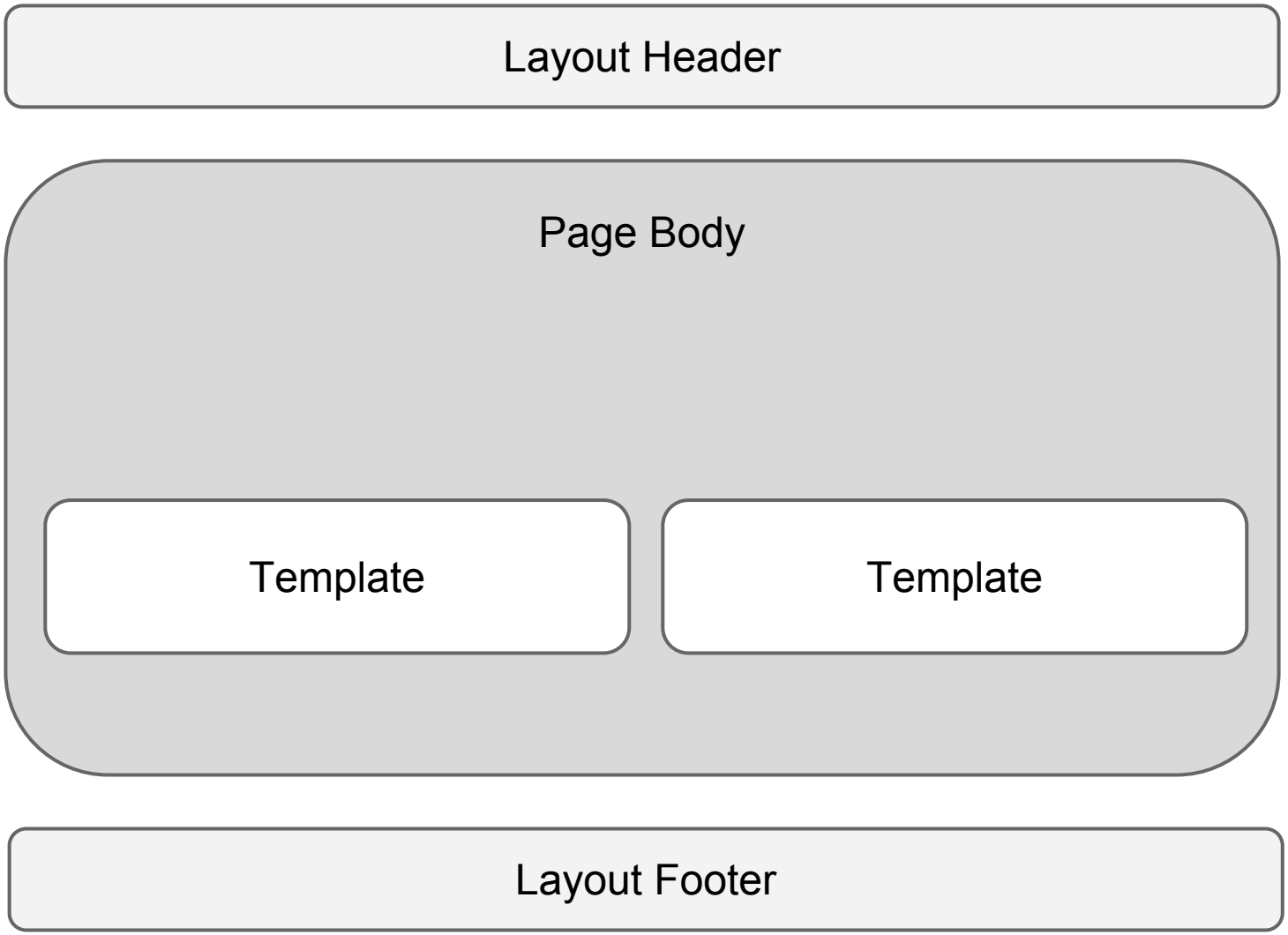
- Split GSPs into multiple templates
  - Share common sections among pages
  - Break up large pages

```
<g:render template="myTemplate"
          model="${[param1: value1, param2: value2]}" />
```

Layouts

- Include common, site-wide markup in one place
  - Page header, footer, etc.
- Wrap GSP in layout

```
<head>
  <meta name="layout" content="main"/>
</head>
```


Layout Header
Page Body
Template
Template
Layout Footer

Minimize Code in View

- Put code logic in Taglibs
- Built-in and custom

Built-In Taglibs

- Forms, links, conditionals, formatting, i18n messages, etc.

```
<g:form controller="invoice" action="submit">
    <g:textField name="invoiceName" />
    <g:submitButton value="Create" />
</g:form>
```

```
<g:if test="${myVal == someVal}">
    <p>My paragraph to display</p>
</g:if>
```

Custom Taglibs

```
UserService userService

def currentUsername = { attrs, body ->
  if (userService.isLoggedIn()) {
    out << userService.currentUser.username
  } else {
    out << ""
  }
}
```

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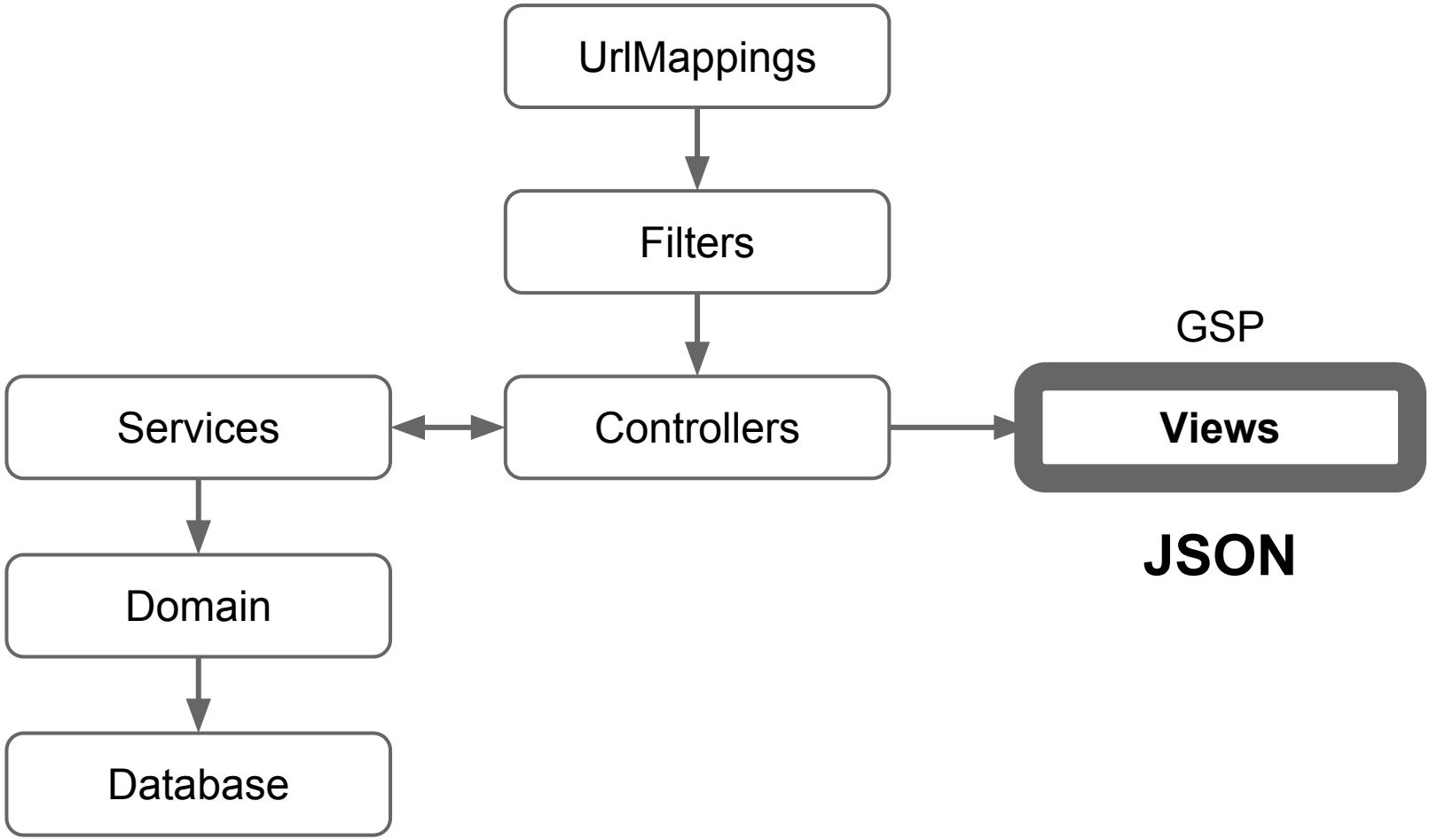

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APIs

- Grails 2.3+
- `@Resource`, `RestfulController`, etc.

@Resource API

```
import grails.rest.Resource

@Resource(uri='/person', formats=['json'])
class Person {
    String firstName
    String lastName
}
```

List all: `GET /person`

Read one: `GET /person/$id`

Create: `POST /person`

Update: `PUT /person/$id`

Delete: `DELETE /person/$id`

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RestfulController

- Add custom actions to built-in CRUD operations

```
class UserController extends RestfulController {
  UserController() {
    super(User)
  }

  def resetPassword(String username) {
    ...
  }
}
```

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Testing

- Tests are first-class citizens
  - Unit and integration tests built in
  - Functional tests through plugins
- Spock is now default test runner

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Spock

- Default test runner in Grails 2.3+
- BDD-style test case structure
- Powerful mocking support
- Easy data-driven testing

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Unit Testing

- @TestFor(Class) for Grails classes
  - Controllers, services, domain, etc.

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```
@Mock(Person)
@TestFor(PersonController)
class PersonControllerSpec extends Specification {

  def 'should create new person'() {
    when:
    // 'controller' is instance of PersonController
    controller.createPerson('Jim', 'Smith')

    then:
    assert Person.findByFirstName('Jim')?.lastName == 'Smith'
  }
}
```

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Integration Testing

- In-memory H2 database
- Great for testing DB access in services
- Automatically rolls back any DB changes between tests


```
class PersonServiceIntegrationSpec extends IntegrationSpec {
  PersonService personService // Automatically injected by Grails

  def 'should find last names of people with given age'() {
    given:
    Person person = new Person(firstName: Jim, lastName: 'Smith',
        age: 37).save()

    when:
    List<String> results = personService.findLastNamesWithAge(37)

    then:
    assert results == [person.lastName]
  }
}
```

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Web Functional Testing

- In-memory H2 database
- Geb for browser functional testing
  - Grails plugin for Geb
- Examples of Grails + Geb
  - github.com/geb/geb-example-grails
  - github.com/craigatk/geb-example

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Development Environment

- CLI works with Windows, Mac, Linux
- Full-featured IDE
  - Groovy/Grails Tool Suite
  - IntelliJ IDEA
- Text editor of your choice
  - Vim, Emacs, Sublime, etc.

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Learn More

- Grails documentation
- StackOverflow
- Books
  - Grails in Action, 2nd edition
  - Definitive Guide to Grails 2
  - Programming Grails (more advanced)

Q & A

Thanks for attending!