The LockManager App Case Study: Server Structure & Functionality

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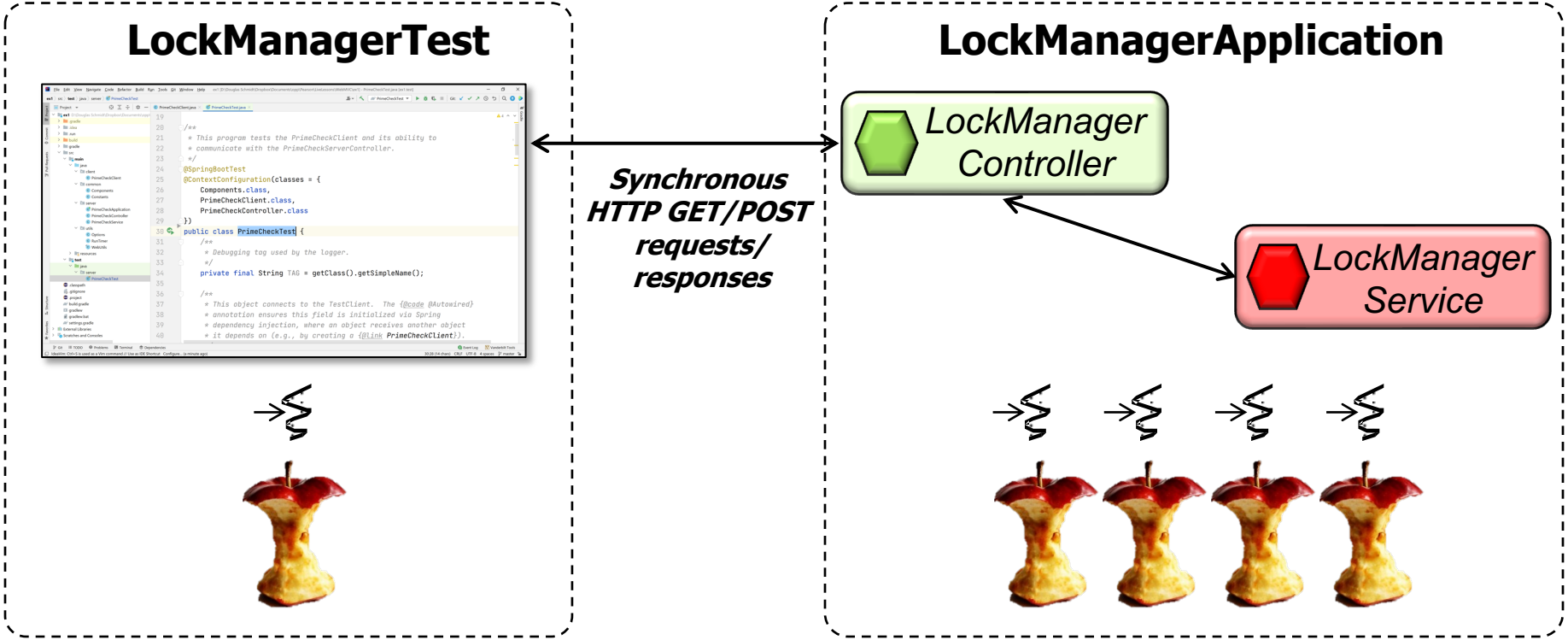
Learning Objectives in this Part of the Lesson

- This case study shows the structure & functionality of the controller & service classes for a LockManager microservice developed using Spring WebMVC



See WebMVC/ex5/src/main/java/edu/vandy/lockmanager/server

Structure & Functionality of the LockManagerController

Structure & Functionality of the LockManagerController

- LockManagerController maps HTTP GET/POST requests to endpoint handlers

```
@RestController
public class LockManagerController {
  @Autowired
  LockManagerService mService;

  ...
```

See WebMVC/ex5/src/main/java/edu/vandy/lockmanager/server/LockManagerController.java

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This annotation ensures request handling methods in the controller class automatically serialize return objects into HttpResponse objects

See www.baeldung.com/spring-controller-vs-restcontroller

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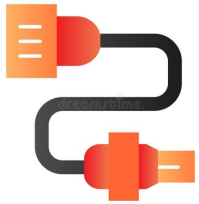

This field is auto-wired by Spring's dependency injection framework

See www.baeldung.com/spring-autowire

Structure & Functionality of the LockManagerController

- LockManagerController maps HTTP GET/POST requests to endpoint handlers

```
@RestController
public class LockManagerController {
   ...
   @PostMapping(CREATE)
   public Boolean create(@RequestBody Integer permitCount)

   @GetMapping(ACQUIRE_LOCK)
   public DeferredResult<Lock> acquire()

   @GetMapping(ACQUIRE_LOCKS)
   public DeferredResult<List<Lock>> acquire(Integer permits)

   @PostMapping(RELEASE_LOCK)
   public Boolean release(@RequestBody Lock lock)

   @PostMapping(RELEASE_LOCKS)
   public Boolean release(@RequestBody List<Lock> locks)
   ...
```

These endpoint handler methods forward to the LockManagerService methods that fulfill the requests

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```

These annotations map HTTP GET/POST requests to endpoint handler methods

See www.baeldung.com/spring-new-requestmapping-shortcuts

Structure & Functionality of the LockManagerController

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   @GetMapping(ACQUIRE_LOCK)
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   public DeferredResult<List<Lock>> acquire(Integer permits)
   @PostMapping(RELEASE_LOCK)
   public Boolean release(@RequestBody Lock lock)
   @PostMapping(RELEASE_LOCKS)
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   ...
```

These strings automatically identify & route to endpoint handler methods from incoming HTTP GET/POST requests

See www.baeldung.com/spring-new-requestmapping-shortcuts

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   @PostMapping(RELEASE_LOCKS)
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   ...
```

This annotation maps the HttpRequest body to a Java object

See www.baeldung.com/spring-request-response-body

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   public DeferredResult<List<Lock>> acquire(Integer permits)
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   public Boolean release(@RequestBody Lock lock)
   @PostMapping(RELEASE_LOCKS)
   public Boolean release(@RequestBody List<Lock> locks)
   ...
```

This Java class enables this microservice to produce the result from a thread of its choice

See springframework/web/context/request/async/DeferredResult.html

Structure & Functionality of the LockManagerService

Structure & Functionality of the LockManagerService

- LockManagerService defines methods called by LockManagerController, which implements a distributed semaphore using a Java ArrayBlockingQueue

```
@Service
public class LockManagerService {
  private ExecutorService mExecutor = Executors
    .newVirtualThreadPerTaskExecutor();

  private ArrayBlockingQueue<Lock>
    mAvailableLocks;
  ...
```

See WebMVC/ex5/src/main/java/edu/vandy/lockmanager/server/LockManagerService.java

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  private ArrayBlockingQueue<Lock>
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  ...
```

This annotation indicates the class implements "business logic" & enables auto-detection & wiring of dependent classes via classpath scanning

See www.baeldung.com/spring-component-repository-service

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  ...
```

This Executor is used to run incoming HTTP requests off the servlet thread

See java/util/concurrent/Executors.html#newVirtualThreadPerTaskExecutor

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  private ArrayBlockingQueue<Lock>
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  ...
```

Limits concurrent access to the fixed number of available locks managed by the LockManagerService

See docs.oracle.com/javase/8/docs/api/java/util/concurrent/ArrayBlockingQueue.html

Structure & Functionality of the LockManagerService

- LockManagerService defines methods called by LockManagerController, which implements a distributed semaphore using a Java ArrayBlockingQueue

```
@Service
public class LockManagerService {
   ...
   public Boolean create(Integer permitCount) {...}
   public DeferredResult<Lock> acquire() {...}
   public DeferredResult<List<Lock>> acquire(Integer permits) {.}
   public Boolean release(Lock lock) {...}
   public Boolean release(List<Lock> locks) {...}
   ...
```

These methods use the Java ArrayBlockingQueue to implement synchronous distributed semaphore semantics

See next part of the lesson on "*Implementing the Server Components*"

End of the LockManager App Case Study: Server Structure & Functionality