

The LockManager App Case Study: Client Structure & Functionality

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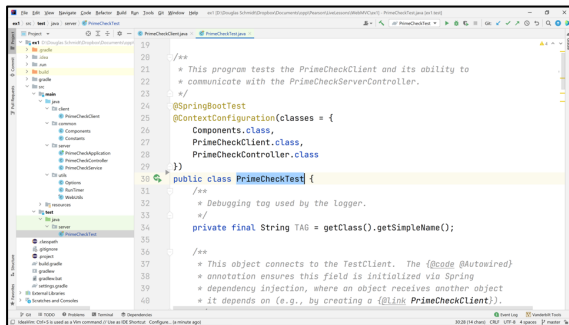
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Learning Objectives in this Part of the Lesson

- Understand the structure & functionality of client components that send/receive HTTP GET/POST requests/responses to/from the microservice synchronously

LockManagerTest



```
19 //
20 // This program tests the PrimeCheckClient and its ability to
21 // communicate with the PrimeCheckServerController.
22 //
23 //
24 @SpringBootTest
25 @ContextConfiguration(classes = {
26     Components.class,
27     PrimeCheckClient.class,
28     PrimeCheckController.class
29 })
30 public class PrimeCheckTest {
31     //
32     // Debugging tag used by the logger.
33     //
34     private final String TAG = getClass().getSimpleName();
35
36     //
37     // This object connects to the TestClient. The @Code @Autowired
38     // annotation ensures this field is initialized via Spring
39     // dependency injection, where an object receives another object
40     // it depends on (e.g., by creating a @Link PrimeCheckClient?).
```



LockManagerApplication



*Synchronous
HTTP GET/POST
requests/
responses*



See github.com/douglasraigschmidt/LiveLessons/tree/master/WebMVC/ex5

The Structure & Functionality of LockAPI Interface

The Structure & Functionality of the LockAPI Interface

- The LockAPI interface hides details of remote method invocations via HTTP

```
public interface LockAPI {  
    @PostExchange(CREATE)  
    Boolean create(@RequestBody Integer maxLocks);  
  
    @GetExchange(ACQUIRE_LOCK)  
    Lock acquire();  
  
    @GetExchange(ACQUIRE_LOCKS)  
    List<Lock> acquire(@RequestParam Integer permits);  
  
    @PostExchange(RELEASE_LOCK)  
    Boolean release(@RequestBody Lock lock);  
  
    @PostExchange(RELEASE_LOCKS)  
    Boolean release(@RequestBody List<Lock> locks);  
}
```

This design uses the new Spring 6 declarative HTTP interface features

See www.baeldung.com/spring-6-http-interface

The Structure & Functionality of the LockAPI Interface

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```
public interface LockAPI {  
    @PostExchange (CREATE)  
    Boolean create (@RequestBody Integer maxLocks) ;  
  
    @GetExchange (ACQUIRE_LOCK)  
    Lock acquire () ;  
  
    @GetExchange (ACQUIRE_LOCKS)  
    List<Lock> acquire (@RequestParam Integer permits) ;  
  
    @PostExchange (RELEASE_LOCK)  
    Boolean release (@RequestBody Lock lock) ;  
  
    @PostExchange (RELEASE_LOCKS)  
    Boolean release (@RequestBody List<Lock> locks) ;  
}
```

These proxy methods shield clients from low-level details of HTTP programming

The Spring 6 HTTP interface features are much cleaner than using Retrofit!

The Structure & Functionality of the LockAPI Interface

- The LockAPI interface hides details of remote method invocations via HTTP

```
public interface LockAPI {
```

```
    @PostExchange (CREATE)
```

```
    Boolean create (@RequestBody Integer maxLocks)
```

```
    @GetExchange (ACQUIRE_LOCK)
```

```
    Lock acquire();
```

```
    @GetExchange (ACQUIRE_LOCKS)
```

```
    List<Lock> acquire (@RequestParam Integer permits);
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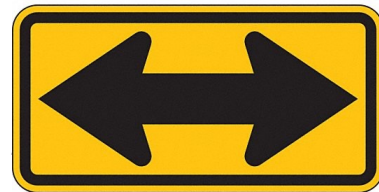
```
    @PostExchange (RELEASE_LOCK)
```

```
    Boolean release (@RequestBody Lock lock);
```

```
    @PostExchange (RELEASE_LOCKS)
```

```
    Boolean release (@RequestBody List<Lock> locks);
```

```
}
```



These calls are all synchronous & return conventional Java types

The Structure & Functionality of the LockAPI Interface

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public interface LockAPI {
```

```
    @PostExchange (CREATE)
```

```
    Boolean create(@RequestBody Integer maxLocks);
```

```
    @GetExchange (ACQUIRE_LOCK)
```

```
    Lock acquire();
```

These annotations mark a method as an HTTP endpoint

```
    @GetExchange (ACQUIRE_LOCKS)
```

```
    List<Lock> acquire(@RequestParam Integer permits);
```

```
    @PostExchange (RELEASE_LOCK)
```

```
    Boolean release(@RequestBody Lock lock);
```

```
    @PostExchange (RELEASE_LOCKS)
```

```
    Boolean release(@RequestBody List<Lock> locks);
```

```
}
```

See <http://declarative-http-client-httpexchange/#3-creating-an-http-service-interface>

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    @PostExchange(RELEASE_LOCK)  
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```

These paths identify a specific HTTP endpoint

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*These annotations are
the same ones used by
a Spring controller*

See www.java67.com/2023/02/requestparam-vs-requestbody-in-spring.html

Creating an Instance of the LockAPI Interface

Creating an Instance of the LockAPI Interface

- The ClientBeans class contains a factory method bean that creates the LockAPI proxy that uses the Spring 6 HTTP interface features

@Component

```
public class ClientBeans {
```

```
    @Bean
```

```
    public LockAPI getLockAPI() {
```

```
        var webClient = WebClient.builder()
```

```
            .baseUrl(LOCK_MANAGER_SERVER_BASE_URL).build();
```

```
        return HttpServiceProxyFactory
```

```
            .builder(WebClientAdapter
```

```
                .forClient(webClient))
```

```
            .build()
```

```
            .createClient(LockAPI.class);
```

```
    ...
```

See <WebMVC/ex5/src/test/java/edu/vandy/lockmanager/ClientBeans.java>

Creating an Instance of the LockAPI Interface

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@Bean

public LockAPI getLockAPI() {

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.baseUrl(LOCK_MANAGER_SERVER_BASE_URL).build();

return HttpServiceProxyFactory

.builder(WebClientAdapter

.forClient(webClient))

.build()

.createClient(LockAPI.class);

...

This @Bean annotation can be injected into classes using Spring's @Autowired annotation

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                .forClient(webClient))
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            .build()
```

```
            .createClient(LockAPI.class);
```

```
    ...
```

*Create the main entry point
for performing web requests
(for both sync & async calls)*

See www.baeldung.com/spring-5-webclient

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            .build()
```

```
            .createClient(LockAPI.class);
```

```
    ...
```

Adapt the WebClient to provide a synchronous proxy

See www.baeldung.com/spring-6-http-interface

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