The LockManager App Case Study: Client Structure & Functionality

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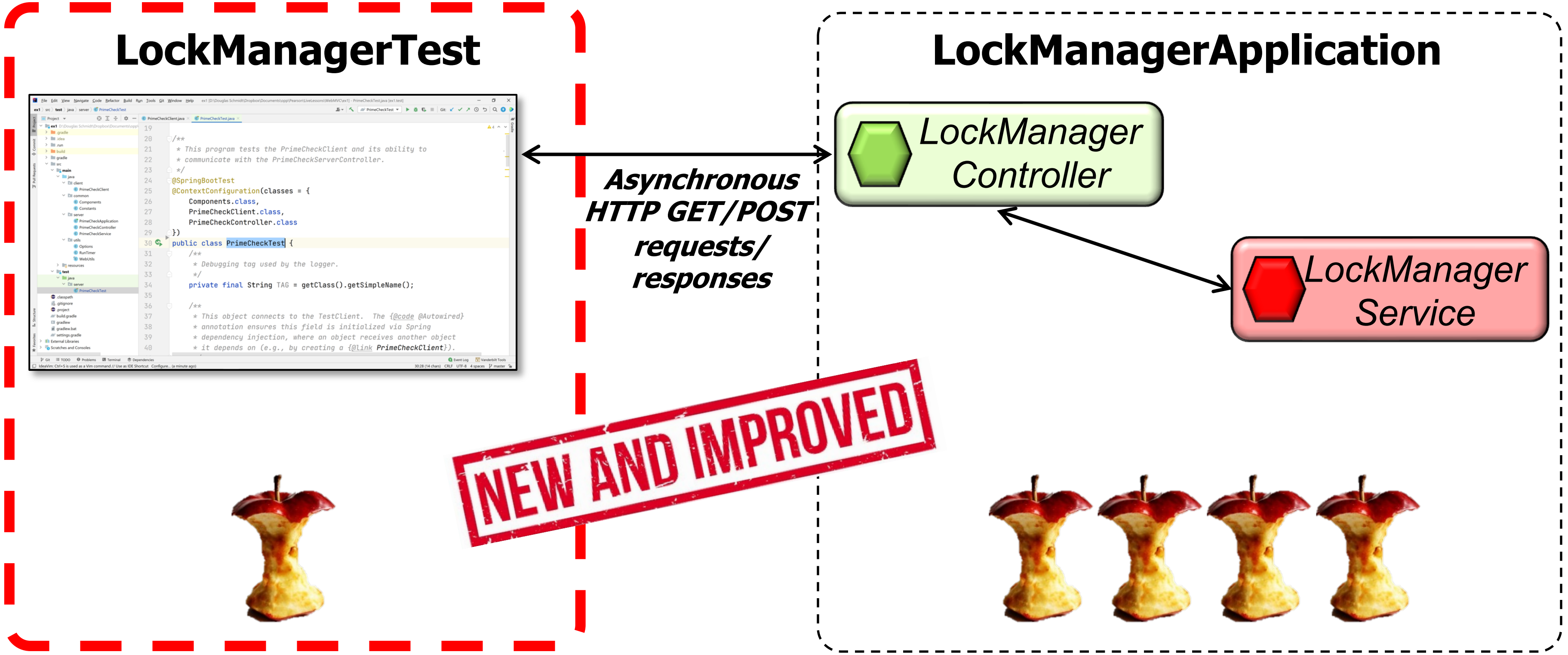
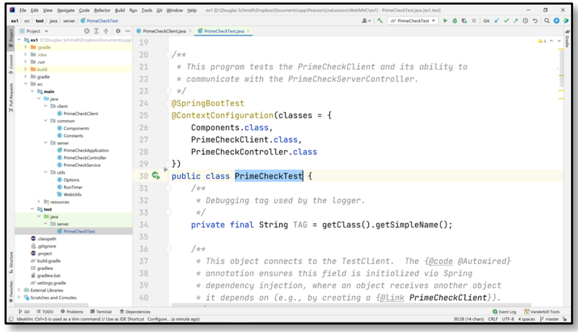
Learning Objectives in this Part of the Lesson

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





```
/**
 * This program tests the PrimeCheckClient and its ability to
 * communicate with the PrimeCheckServerController.
 */
@SpringBootTest
@ContextConfiguration(classes = {
    Components.class,
    PrimeCheckClient.class,
    PrimeCheckController.class
})
public class PrimeCheckTest {
    /**
     * Debugging tag used by the logger.
     */
    private final String TAG = getClass().getSimpleName();

    /**
     * This object connects to the TestClient.  The {@code @Autowired}
     * annotation ensures this field is initialized via Spring
     * dependency injection, where an object receives another object
     * it depends on (e.g., by creating a {@link PrimeCheckClient}).
```

See WebFlux/ex1/src/test/java/edu/vandy/lockmanager/client

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)
  Mono<Boolean> create(@RequestBody Integer maxLocks);

  @GetExchange(ACQUIRE_LOCK)
  Mono<Lock> acquire();

  @GetExchange(ACQUIRE_LOCKS)
  Flux<Lock> acquire(@RequestParam Integer permits);

  @PostExchange(RELEASE_LOCK)
  Mono<Boolean> release(@RequestBody Lock lock);

  @PostExchange(RELEASE_LOCKS)
  Mono<Boolean> release(@RequestBody Flux<Lock> locks);
}
```

See WebFlux/ex1/src/test/java/edu/vandy/lockmanager/client/LockAPI.java

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This design uses the new Spring 6 declarative HTTP interface features

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

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

The Spring 6 HTTP interface features provide features unavailable in Retrofit!

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These calls are all asynchronous & return reactive Project Reactor types

See spring.io/blog/2016/04/19/understanding-reactive-types

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These annotations mark a method as an HTTP endpoint

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

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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 WebFlux/ex1/src/test/java/edu/vandy/lockmanager/client/ClientBeans.java

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

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  ...
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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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Adapt the WebClient to provide an async proxy

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

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  ...
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Clients can use LockAPI to send/receive reactive types

See last part of lesson on "*The LockManager App Case Study: Test Driver & Client Implementation*"

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