

INSTITUTO TECNOLOGICO DE FRONTERA COMALAPA

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NOMBRE DEL TRABAJO: Ejercicios.

FRONTERA COMALAPA, CHIAPAS A 14 DE NOVIEMBRE DE 2025

Ejercicios

Introducción

En esta iniciativa de desarrollo se trabajó con los frameworks React, Astro, NestJS y Angular, creando los microservicios Student y Course dentro del entorno IntelliJ IDEA. Durante el proceso se implementaron pruebas unitarias, de integración, de aceptación, de seguridad, de sistema, de rendimiento y de usabilidad, con el objetivo de asegurar que los microservicios operen de manera correcta, sean seguros y proporcionen una experiencia satisfactoria al usuario final.

Los resultados obtenidos hasta el momento se visualizan en color verde, lo que confirma que los módulos cumplen con los estándares de funcionamiento establecidos y que las funcionalidades implementadas están validadas exitosamente.

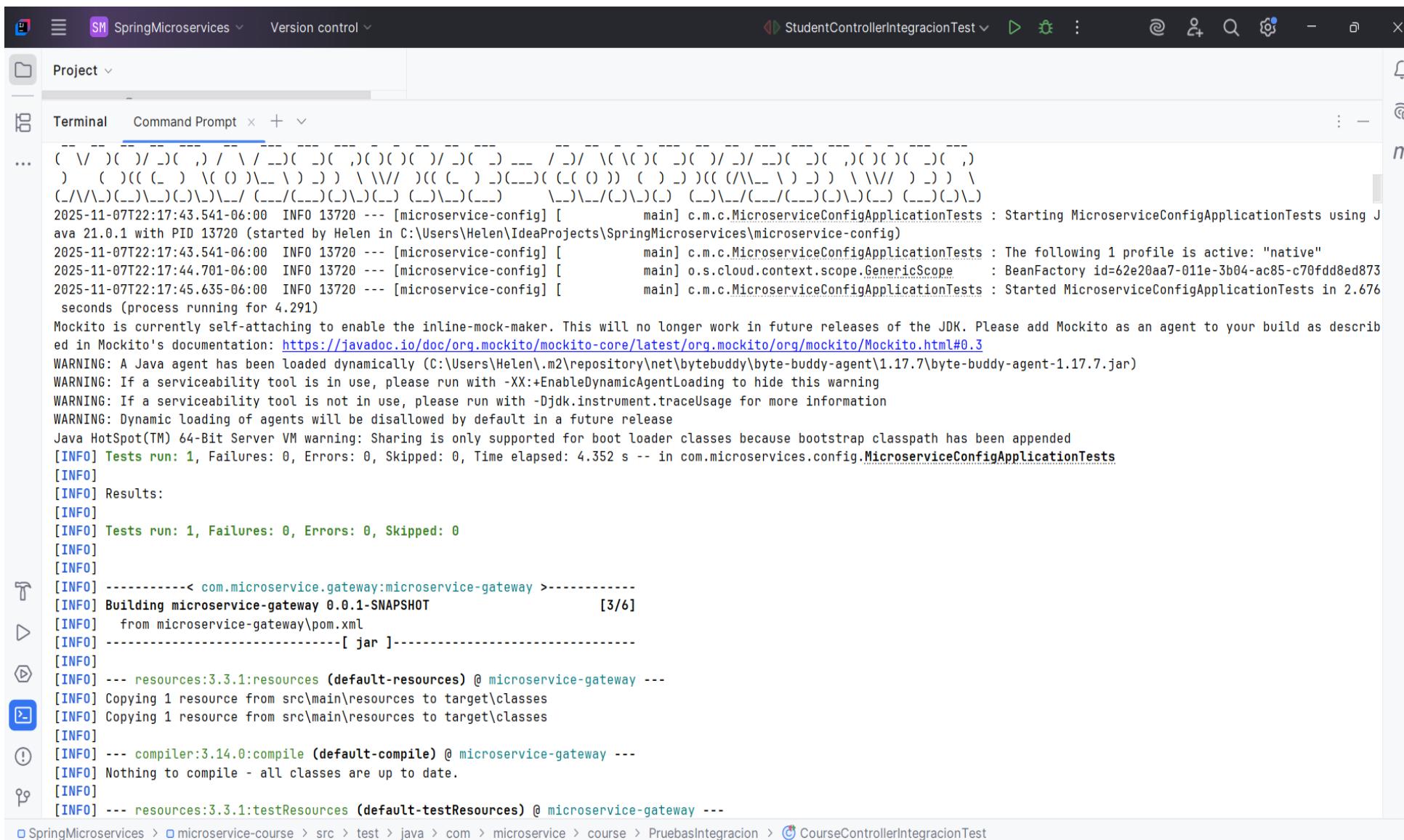
Justificación

La realización de pruebas en los microservicios es esencial para garantizar su confiabilidad, estabilidad y correcto funcionamiento. Cada tipo de prueba cumple un rol específico: las pruebas unitarias validan de forma aislada que los métodos y componentes se comporten según lo esperado, mientras que las pruebas de integración verifican que los distintos módulos y servicios interactúen correctamente entre sí.

Las pruebas de aceptación confirman que los endpoints y componentes cumplen con los requisitos establecidos por el usuario, y las pruebas de seguridad protegen el sistema frente a accesos no autorizados y posibles vulnerabilidades. Por su parte, las pruebas de sistema evalúan el comportamiento global de los microservicios, las de rendimiento miden la rapidez y eficiencia de las operaciones críticas, y las de usabilidad analizan la experiencia del usuario, asegurando que la interfaz sea clara y funcional. La combinación de todas estas pruebas permite detectar errores, optimizar el software y garantizar que los microservicios estén completamente preparados para su implementación en entornos reales.

Pruebas unitarias microservice-config

Para comprobar que las pruebas unitarias se ejecutan correctamente, utilizamos comandos que permiten correr los tests y observar los resultados. Cuando la prueba se realiza exitosamente, el resultado se muestra en verde, como ocurre en este caso con el Test 1.



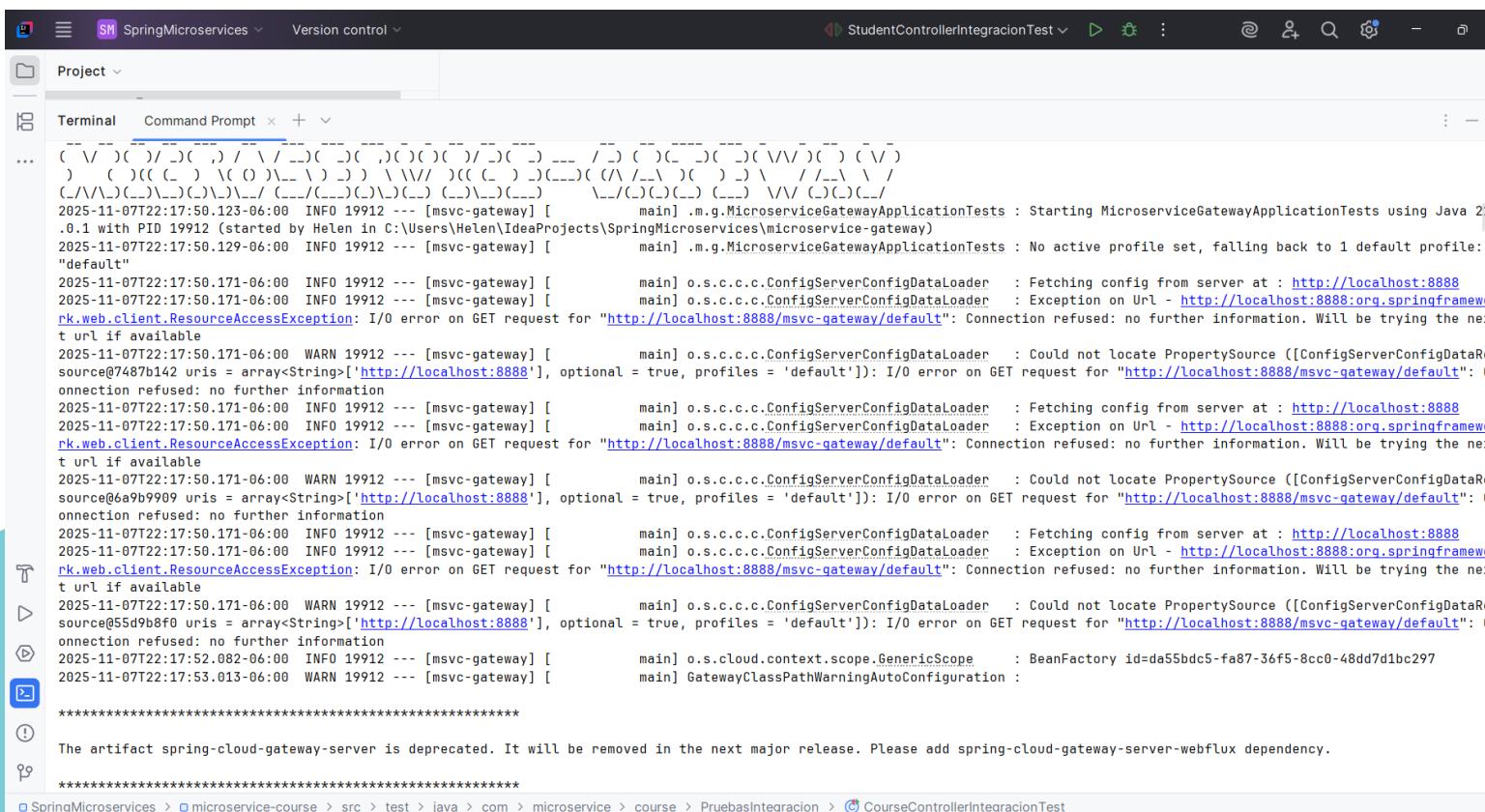
The screenshot shows a terminal window within an IDE. The title bar indicates the project is 'SpringMicroservices' and the current file is 'StudentControllerIntegracionTest'. The terminal output displays the following log:

```
2025-11-07T22:17:43.541-06:00 INFO 13720 --- [microservice-config] [main] c.m.c.MicroserviceConfigApplicationTests : Starting MicroserviceConfigApplicationTests using Java 21.0.1 with PID 13720 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-config)
2025-11-07T22:17:43.541-06:00 INFO 13720 --- [microservice-config] [main] c.m.c.MicroserviceConfigApplicationTests : The following 1 profile is active: "native"
2025-11-07T22:17:44.701-06:00 INFO 13720 --- [microservice-config] [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=62e20aa7-011e-3b04-ac85-c70fdd8ed873
2025-11-07T22:17:45.635-06:00 INFO 13720 --- [microservice-config] [main] c.m.c.MicroserviceConfigApplicationTests : Started MicroserviceConfigApplicationTests in 2.676 seconds (process running for 4.291)
Mockito is currently self-attaching to enable the inline-mock-maker. This will no longer work in future releases of the JDK. Please add Mockito as an agent to your build as described in Mockito's documentation: https://javadoc.io/doc/org.mockito/mockito-core/latest/org/mockito/org/mockito/Mockito.html#0.3
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.17.7\byte-buddy-agent-1.17.7.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 4.352 s -- in com.microservices.config.MicroserviceConfigApplicationTests
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] -----< com.microservice.gateway:microservice-gateway >-----
[INFO] Building microservice-gateway 0.0.1-SNAPSHOT [3/6]
[INFO]   from microservice-gateway\pom.xml
[INFO]   -----[ jar ]-----
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ microservice-gateway ---
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO] Copying 1 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.14.0:compile (default-compile) @ microservice-gateway ---
[INFO] Nothing to compile - all classes are up to date.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ microservice-gateway ---
```

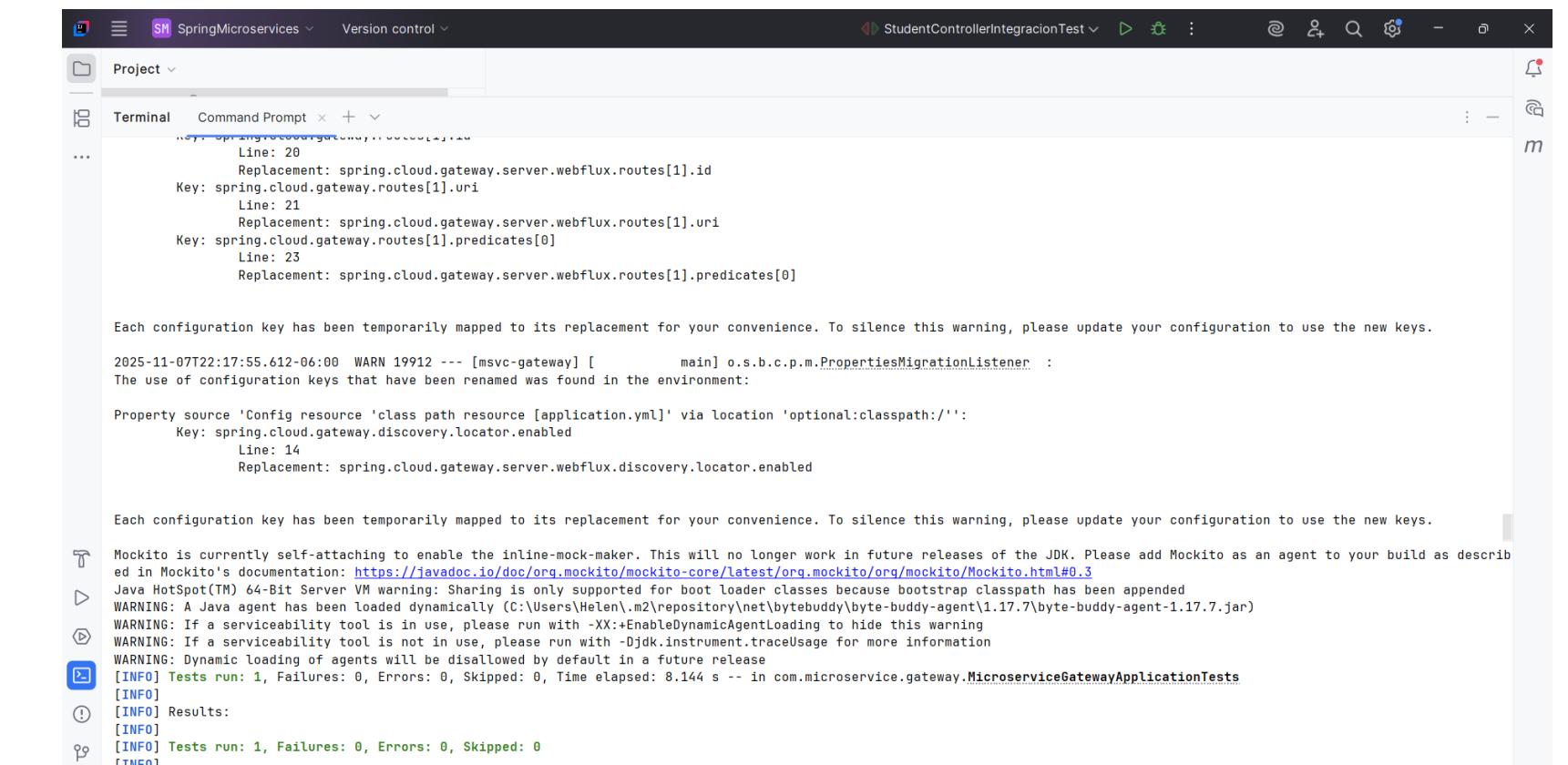
The terminal shows the test results and the build process for the 'microservice-gateway' module. The test 'MicroserviceConfigApplicationTests' ran successfully with 1 test, 0 failures, 0 errors, and 0 skipped. The build step for 'resources' copied resources from 'src\main\resources' to 'target\classes', and the 'compiler' step found no changes to compile.

Pruebas unitarias microservice-gateway

Para asegurarnos de que las pruebas unitarias en Gateway funcionen correctamente, se ejecutan mediante comandos. Cuando las pruebas se completan con éxito, los resultados se muestran en verde, confirmando que todo está operando correctamente.



```
2025-11-07T22:17:50.123-06:00 INFO 19912 --- [msvc-gateway] [main] .m.g.MicroserviceGatewayApplicationTests : Starting MicroserviceGatewayApplicationTests using Java 21.0.1 with PID 19912 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-gateway)
2025-11-07T22:17:50.129-06:00 INFO 19912 --- [msvc-gateway] [main] .m.g.MicroserviceGatewayApplicationTests : No active profile set, falling back to 1 default profile: "default"
2025-11-07T22:17:50.171-06:00 INFO 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Fetching config from server at : http://localhost:8888
2025-11-07T22:17:50.171-06:00 INFO 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Exception on Url - http://localhost:8888:org.springframework.web.client.ResourceAccessException: I/O error on GET request for "http://localhost:8888/msvc-gateway/default": Connection refused: no further information. Will be trying the next url if available
2025-11-07T22:17:50.171-06:00 WARN 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Could not locate PropertySource ([ConfigServerConfigDataResource@7487b142 uris = array<String>['http://localhost:8888'], optional = true, profiles = 'default']): I/O error or GET request for "http://localhost:8888/msvc-gateway/default": Connection refused: no further information
2025-11-07T22:17:50.171-06:00 INFO 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Fetching config from server at : http://localhost:8888
2025-11-07T22:17:50.171-06:00 INFO 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Exception on Url - http://localhost:8888:org.springframework.web.client.ResourceAccessException: I/O error on GET request for "http://localhost:8888/msvc-gateway/default": Connection refused: no further information. Will be trying the next url if available
2025-11-07T22:17:50.171-06:00 WARN 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Could not locate PropertySource ([ConfigServerConfigDataResource@6a9b9909 uris = array<String>['http://localhost:8888'], optional = true, profiles = 'default']): I/O error or GET request for "http://localhost:8888/msvc-gateway/default": Connection refused: no further information
2025-11-07T22:17:50.171-06:00 INFO 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Fetching config from server at : http://localhost:8888
2025-11-07T22:17:50.171-06:00 INFO 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Exception on Url - http://localhost:8888:org.springframework.web.client.ResourceAccessException: I/O error on GET request for "http://localhost:8888/msvc-gateway/default": Connection refused: no further information. Will be trying the next url if available
2025-11-07T22:17:50.171-06:00 WARN 19912 --- [msvc-gateway] [main] o.s.c.c.c.ConfigServerConfigDataLoader : Could not locate PropertySource ([ConfigServerConfigDataResource@5d9d8f0 uris = array<String>['http://localhost:8888'], optional = true, profiles = 'default']): I/O error or GET request for "http://localhost:8888/msvc-gateway/default": Connection refused: no further information
2025-11-07T22:17:52.082-06:00 INFO 19912 --- [msvc-gateway] [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=da55bdc5-fa87-36f5-8cc0-48dd7d1bc297
2025-11-07T22:17:53.013-06:00 WARN 19912 --- [msvc-gateway] [main] GatewayClassPathWarningAutoConfiguration :
*****
The artifact spring-cloud-gateway-server is deprecated. It will be removed in the next major release. Please add spring-cloud-gateway-server-webflux dependency.
*****
SpringMicroservices > microservice-course > src > test > java > com > microservice > course > PruebasIntegracion > CourseControllerIntegracionTest
```



```
Line: 20
Replacement: spring.cloud.gateway.routes[1].id
Key: spring.cloud.gateway.routes[1].uri
Line: 21
Replacement: spring.cloud.gateway.server.webflux.routes[1].uri
Key: spring.cloud.gateway.routes[1].predicates[0]
Line: 23
Replacement: spring.cloud.gateway.server.webflux.routes[1].predicates[0]

Each configuration key has been temporarily mapped to its replacement for your convenience. To silence this warning, please update your configuration to use the new keys.

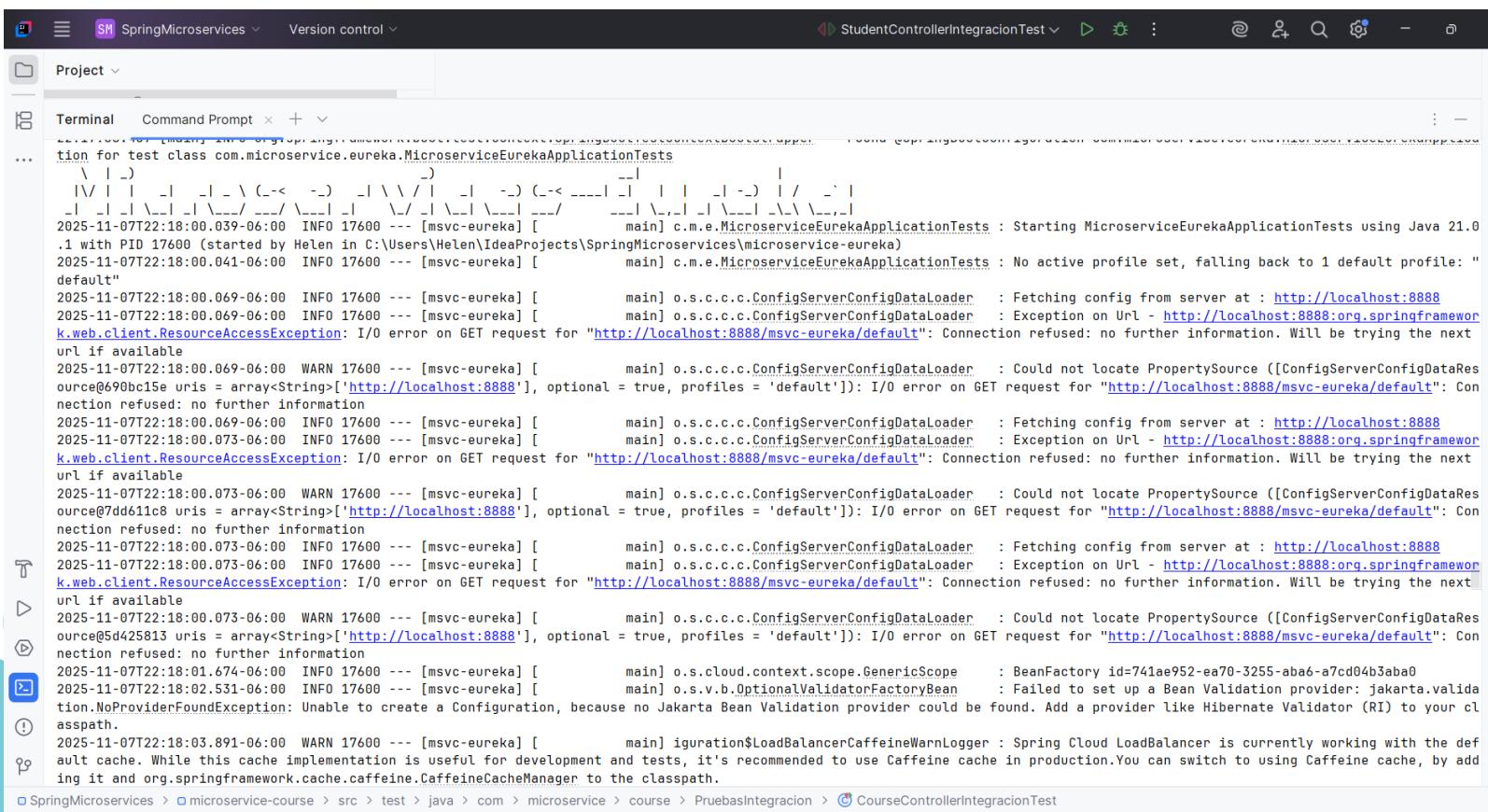
2025-11-07T22:17:55.612-06:00 WARN 19912 --- [msvc-gateway] [main] o.s.b.c.p.m.PropertiesMigrationListener :
The use of configuration keys that have been renamed was found in the environment:
Property source 'Config resource 'class path resource [application.yml]' via location 'optional:classpath://' :
Key: spring.cloud.gateway.discovery.locator.enabled
Line: 14
Replacement: spring.cloud.gateway.server.webflux.discovery.locator.enabled

Each configuration key has been temporarily mapped to its replacement for your convenience. To silence this warning, please update your configuration to use the new keys.

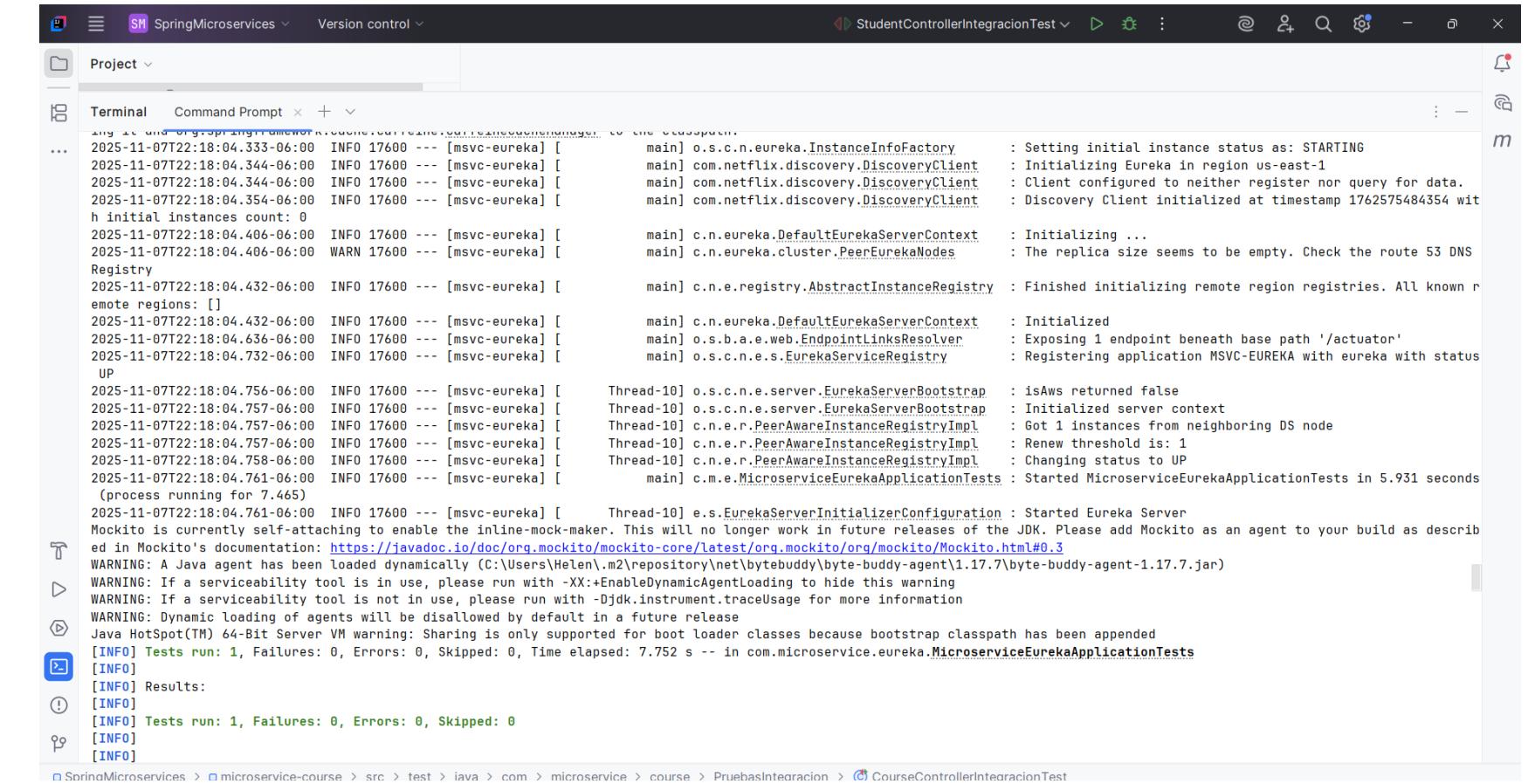
Mockito is currently self-attaching to enable the inline-mock-maker. This will no longer work in future releases of the JDK. Please add Mockito as an agent to your build as described in Mockito's documentation: https://javadoc.io/doc/org.mockito/mockito-core/latest/org/mockito/org/mockito.html#0.3
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.17.7\byte-buddy-agent-1.17.7.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 8.144 s -- in com.microservice.gateway.MicroserviceGatewayApplicationTests
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
```

Pruebas unitarias microservice-eureka

Para comprobar que las pruebas unitarias en Eureka se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Cuando las pruebas se realizan con éxito, los resultados se muestran en verde, indicando que todo funciona correctamente.



```
...tion for test class com.microservice.eureka.MicroserviceEurekaApplicationTests
...
2025-11-07T22:18:00.039-06:00 INFO 17600 --- [msvc-eureka] [main] c.m.e.MicroserviceEurekaApplicationTests : Starting MicroserviceEurekaApplicationTests using Java 21.0
2025-11-07T22:18:00.041-06:00 INFO 17600 --- [msvc-eureka] [main] c.m.e.MicroserviceEurekaApplicationTests : No active profile set, falling back to 1 default profile: "default"
2025-11-07T22:18:00.069-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Fetching config from server at : http://localhost:8888
2025-11-07T22:18:00.069-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Exception on Url - http://localhost:8888/org.springframework.web.client.ResourceAccessException: I/O error on GET request for "http://localhost:8888/msvc-eureka/default": Connection refused: no further information. Will be trying the next url if available
2025-11-07T22:18:00.069-06:00 WARN 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Could not locate PropertySource ([ConfigServerConfigDataRes
ource@690bc15e uris = array<String:[http://localhost:8888], optional = true, profiles = 'default']): I/O error on GET request for "http://localhost:8888/msvc-eureka/default": Con
nection refused: no further information
2025-11-07T22:18:00.069-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Fetching config from server at : http://localhost:8888
2025-11-07T22:18:00.073-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Exception on Url - http://localhost:8888/org.springframework.web.client.ResourceAccessException: I/O error on GET request for "http://localhost:8888/msvc-eureka/default": Connection refused: no further information. Will be trying the next url if available
2025-11-07T22:18:00.073-06:00 WARN 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Could not locate PropertySource ([ConfigServerConfigDataRes
ource@7ddc11cb uris = array<String:[http://localhost:8888], optional = true, profiles = 'default']): I/O error on GET request for "http://localhost:8888/msvc-eureka/default": Con
nection refused: no further information
2025-11-07T22:18:00.073-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Fetching config from server at : http://localhost:8888
2025-11-07T22:18:00.073-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Exception on Url - http://localhost:8888/org.springframework.web.client.ResourceAccessException: I/O error on GET request for "http://localhost:8888/msvc-eureka/default": Connection refused: no further information. Will be trying the next url if available
2025-11-07T22:18:00.073-06:00 WARN 17600 --- [msvc-eureka] [main] o.s.c.c.ConfigServerConfigDataLoader : Could not locate PropertySource ([ConfigServerConfigDataRes
ource@5d425813 uris = array<String:[http://localhost:8888], optional = true, profiles = 'default']): I/O error on GET request for "http://localhost:8888/msvc-eureka/default": Con
nection refused: no further information
2025-11-07T22:18:01.674-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=741ae952-ea70-3255-aba6-a7cd04b3aba0
2025-11-07T22:18:02.531-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.v.b.OptionalValidatorFactoryBean : Failed to set up a Bean Validation provider: jakarta.validation.NoProviderFoundException: Unable to create a Configuration, because no Jakarta Bean Validation provider could be found. Add a provider like Hibernate Validator (RI) to your classpath.
2025-11-07T22:18:03.891-06:00 WARN 17600 --- [msvc-eureka] [main] org.springframework.boot.loader.CaffeineCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
```



```
...tarting Eureka in region us-east-1
2025-11-07T22:18:04.344-06:00 INFO 17600 --- [msvc-eureka] [main] com.netflix.discovery.DiscoveryClient : Client configured to neither register nor query for data.
2025-11-07T22:18:04.354-06:00 INFO 17600 --- [msvc-eureka] [main] com.netflix.discovery.DiscoveryClient : Discovery Client initialized at timestamp 1762575484354 with initial instances count: 0
2025-11-07T22:18:04.406-06:00 INFO 17600 --- [msvc-eureka] [main] c.n.eureka.DefaultEurekaServerContext : Initializing ...
2025-11-07T22:18:04.406-06:00 WARN 17600 --- [msvc-eureka] [main] c.n.eureka.cluster.PeerEurekaNodes : The replica size seems to be empty. Check the route 53 DNS Registry
2025-11-07T22:18:04.432-06:00 INFO 17600 --- [msvc-eureka] [main] c.n.e.registry.AbstractInstanceRegistry : Finished initializing remote region registries. All known regions: []
2025-11-07T22:18:04.432-06:00 INFO 17600 --- [msvc-eureka] [main] c.n.eureka.DefaultEurekaServerContext : Initialized
2025-11-07T22:18:04.636-06:00 INFO 17600 --- [msvc-eureka] [main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 1 endpoint beneath base path '/actuator'
2025-11-07T22:18:04.732-06:00 INFO 17600 --- [msvc-eureka] [main] c.n.e.e.s.EurekaServiceRegistry : Registering application MSVC-EUREKA with eureka with status UP
2025-11-07T22:18:04.756-06:00 INFO 17600 --- [msvc-eureka] [Thread-10] o.s.c.n.e.server.EurekaServerBootstrap : Thread-10 o.s.c.n.e.server.EurekaServerBootstrap : isAws returned false
2025-11-07T22:18:04.757-06:00 INFO 17600 --- [msvc-eureka] [Thread-10] o.s.c.n.e.server.EurekaServerBootstrap : Thread-10 o.s.c.n.e.server.EurekaServerBootstrap : Initialized server context
2025-11-07T22:18:04.757-06:00 INFO 17600 --- [msvc-eureka] [Thread-10] c.n.e.r.PeerAwareInstanceRegistryImpl : Thread-10 c.n.e.r.PeerAwareInstanceRegistryImpl : Got 1 instances from neighboring DS node
2025-11-07T22:18:04.757-06:00 INFO 17600 --- [msvc-eureka] [Thread-10] c.n.e.r.PeerAwareInstanceRegistryImpl : Thread-10 c.n.e.r.PeerAwareInstanceRegistryImpl : Renew threshold is: 1
2025-11-07T22:18:04.758-06:00 INFO 17600 --- [msvc-eureka] [Thread-10] c.n.e.r.PeerAwareInstanceRegistryImpl : Thread-10 c.n.e.r.PeerAwareInstanceRegistryImpl : Changing status to UP
2025-11-07T22:18:04.761-06:00 INFO 17600 --- [msvc-eureka] [main] c.m.e.MicroserviceEurekaApplicationTests : Started MicroserviceEurekaApplicationTests in 5.931 seconds
(Thread-10) process running for 7,465
2025-11-07T22:18:04.761-06:00 INFO 17600 --- [msvc-eureka] [Thread-10] e.s.EurekaServerInitializerConfiguration : Thread-10 e.s.EurekaServerInitializerConfiguration : Started Eureka Server
Mockito is currently self-attaching to enable the inline-mock-maker. This will no longer work in future releases of the JDK. Please add Mockito as an agent to your build as described in Mockito's documentation: https://javadoc.io/doc/org.mockito/mockito-core/latest/org.mockito/org.mockito.Mockito.html#0\_3
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net.bytebuddy/byte-buddy-agent\1.17.7\byte-buddy-agent-1.17.7.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 7.752 s -- in com.microservice.eureka.MicroserviceEurekaApplicationTests
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
```

Pruebas unitarias microservice-student

Para comprobar que las pruebas unitarias del microservicio Student se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Cuando las pruebas se completan con éxito, los resultados se muestran en verde, indicando que todo funciona correctamente.

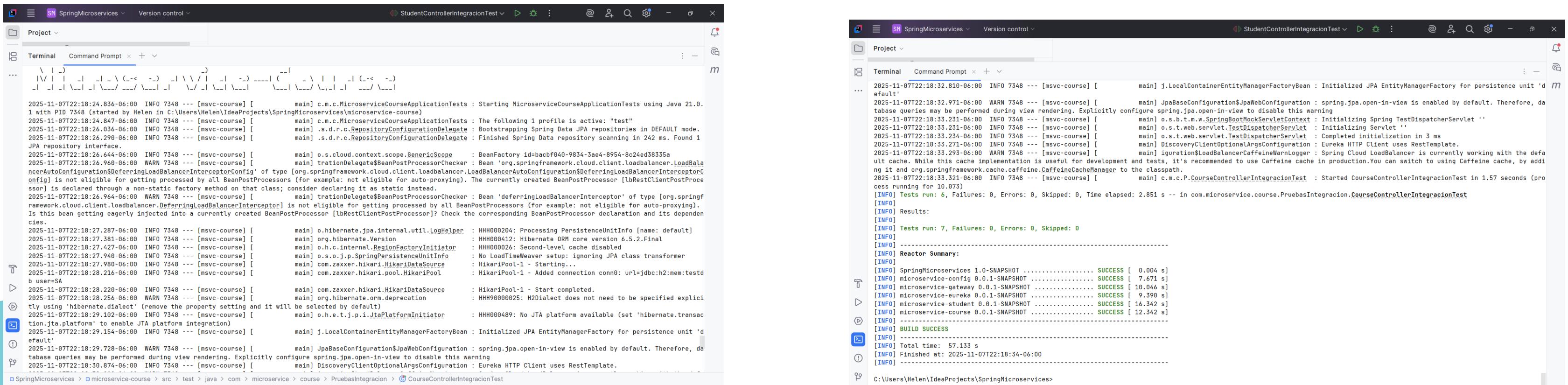
The image shows two side-by-side terminal windows from a code editor interface. Both terminals are running the command `mvn test -Dtest=StudentControllerIntegrationTest`. The left terminal window displays the output of the test execution, which includes numerous INFO log entries from various Spring and Hibernate components, such as EntityManagerFactory initialization, repository scanning, and database connection setup. The right terminal window shows the final test results summary. It indicates that 25 tests were run, 0 failures occurred, 0 errors were found, and 0 skips were recorded. The overall time elapsed for the test run was 0.648 seconds.

```
2025-11-07T22:18:09.238+06:00 INFO 3040 --- [main] .m.s.MicroserviceStudentApplicationTests : Starting MicroserviceStudentApplicationTests using Java 21.0.1 with PID 3040 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student)
2025-11-07T22:18:09.243+06:00 INFO 3040 --- [main] .m.s.MicroserviceStudentApplicationTests : No active profile set, falling back to 1 default profile: "default"
2025-11-07T22:18:10.797+06:00 INFO 3040 --- [main] .s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-07T22:18:10.944+06:00 INFO 3040 --- [main] .s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 141 ms. Found 1 JPA repository interface.
2025-11-07T22:18:11.320+06:00 INFO 3040 --- [main] o.s.cloud.context.GenericScope : BeanFactory id=e1221e0d-2932-3956-acd8-4ba9566c3e72
2025-11-07T22:18:11.869+06:00 WARN 3040 --- [main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-07T22:18:11.880+06:00 WARN 3040 --- [main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean being eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-07T22:18:12.307+06:00 INFO 3040 --- [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T22:18:12.428+06:00 INFO 3040 --- [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T22:18:12.510+06:00 INFO 3040 --- [main] o.h.c.internal.RegionFactoryInitiator : HHH00026: Second-Level cache disabled
2025-11-07T22:18:12.959+06:00 INFO 3040 --- [main] o.s.o.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:18:12.988+06:00 INFO 3040 --- [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T22:18:13.261+06:00 INFO 3040 --- [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T22:18:13.261+06:00 INFO 3040 --- [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:18:13.302+06:00 WARN 3040 --- [main] org.hibernate.orm.deprecation : HHH9000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:18:14.198+06:00 INFO 3040 --- [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:18:14.243+06:00 INFO 3040 --- [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:18:15.886+06:00 WARN 3040 --- [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:18:17.654+06:00 INFO 3040 --- [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:18:17.765+06:00 WARN 3040 --- [main] iguration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
```

```
2025-11-07T22:18:19.756+06:00 INFO 3040 --- [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:18:19.933+06:00 WARN 3040 --- [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:18:20.454+06:00 INFO 3040 --- [main] o.s.b.t.m.w.SpringBootTestBootHook : Initializing Spring TestDispatcherServlet
2025-11-07T22:18:20.465+06:00 INFO 3040 --- [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:18:20.486+06:00 INFO 3040 --- [main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 1 endpoint beneath base path '/actuator'
2025-11-07T22:18:20.534+06:00 INFO 3040 --- [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 66 ms
2025-11-07T22:18:20.698+06:00 INFO 3040 --- [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:18:20.767+06:00 WARN 3040 --- [main] iguration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
2025-11-07T22:18:20.791+06:00 INFO 3040 --- [main] o.s.c.n.e.EurekaInstanceInfoFactory : Setting initial instance status as: STARTING
2025-11-07T22:18:20.792+06:00 INFO 3040 --- [main] com.netflix.discovery.DiscoveryClient : Initializing Eureka in region us-east-1
2025-11-07T22:18:20.792+06:00 INFO 3040 --- [main] com.netflix.discovery.DiscoveryClient : Client configured to neither register nor query for data.
2025-11-07T22:18:20.792+06:00 INFO 3040 --- [main] com.netflix.discovery.DiscoveryClient : Discovery Client initialized at timestamp 1762575500792 with initial instances count: 0
2025-11-07T22:18:20.800+06:00 INFO 3040 --- [main] o.s.c.n.e.s.EurekaServiceRegistry : Registering application UNKNOWN with eureka with status UP
2025-11-07T22:18:20.807+06:00 INFO 3040 --- [main] c.m.s.P.StudentControllerIntegrationTest : Started StudentControllerIntegrationTest in 1.893 seconds (process running for 13.186)
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 2.596 s -- in com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest
[INFO] Running com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest
2025-11-07T22:18:21.475+06:00 INFO 3040 --- [main] t.c.s.AnnotationConfigContextLoaderUtils : Could not detect default configuration classes for test class [com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest]: StudentControllerIntegrationTest does not declare any static, non-private, non-final, nested classes annotated with @Configuration.
2025-11-07T22:18:21.479+06:00 INFO 3040 --- [main] b.t.c.SpringBootTestBootContextBootstrapper : Found @SpringBootConfiguration com.microservice.student.MicroserviceStudentApplication for test class com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.106 s -- in com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest
[INFO] Running com.microservice.student.PruebasUnitarias.StudentControllerTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.648 s -- in com.microservice.student.PruebasUnitarias.StudentControllerTest
[INFO] Results:
[INFO] Tests run: 25, Failures: 0, Errors: 0, Skipped: 0
[INFO]
```

Pruebas unitarias microservice-course

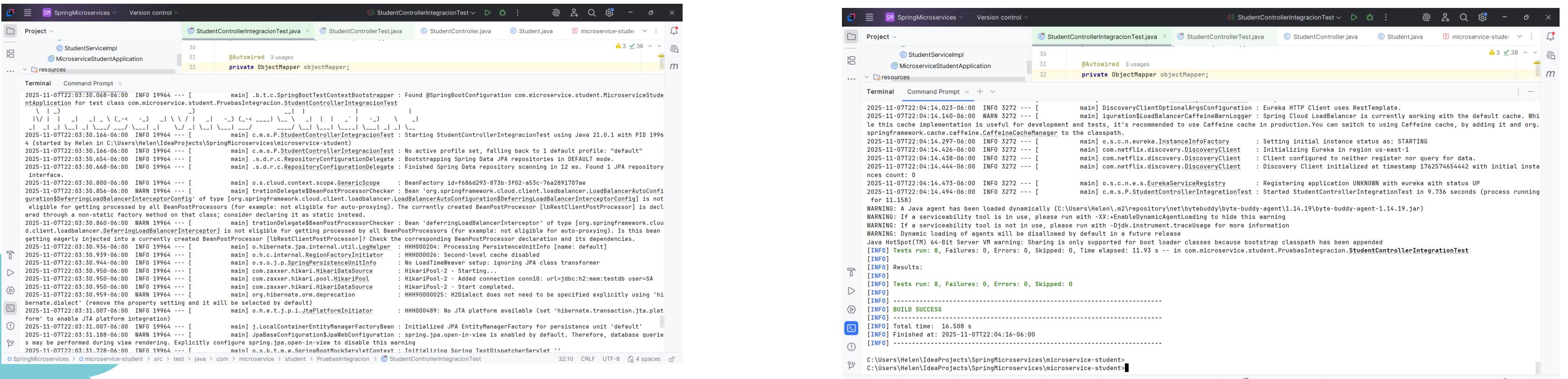
Para comprobar que las pruebas unitarias del microservicio Course se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Cuando las pruebas se realizan con éxito, los resultados se muestran en verde, confirmando que todo funciona correctamente.



The image shows two side-by-side terminal windows from the IntelliJ IDEA IDE. Both terminals are titled "Terminal" and show command-line output. The left terminal window displays a large amount of log output from a Java application, primarily from the "msvc-course" package. It includes logs for starting the application, initializing repositories, and setting up databases. The right terminal window shows the results of a test run. The output starts with several informational messages about the test environment, followed by a summary of the test results: "Tests run: 6, Failures: 0, Errors: 0, Skipped: 0". Below this, it provides a "Reactor Summary" with individual test results for various components like "SpringMicroservices", "microservice-config", "microservice-gateway", etc., all marked as "SUCCESS". At the bottom of the right terminal, it shows the total build time as "57.133 s" and the completion time as "2025-11-07T22:18:34-06:00".

Pruebas de integración student

Para comprobar que las pruebas de integración del microservicio Student se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Al completarse exitosamente, los resultados se muestran en verde, indicando que todo funciona como se espera.

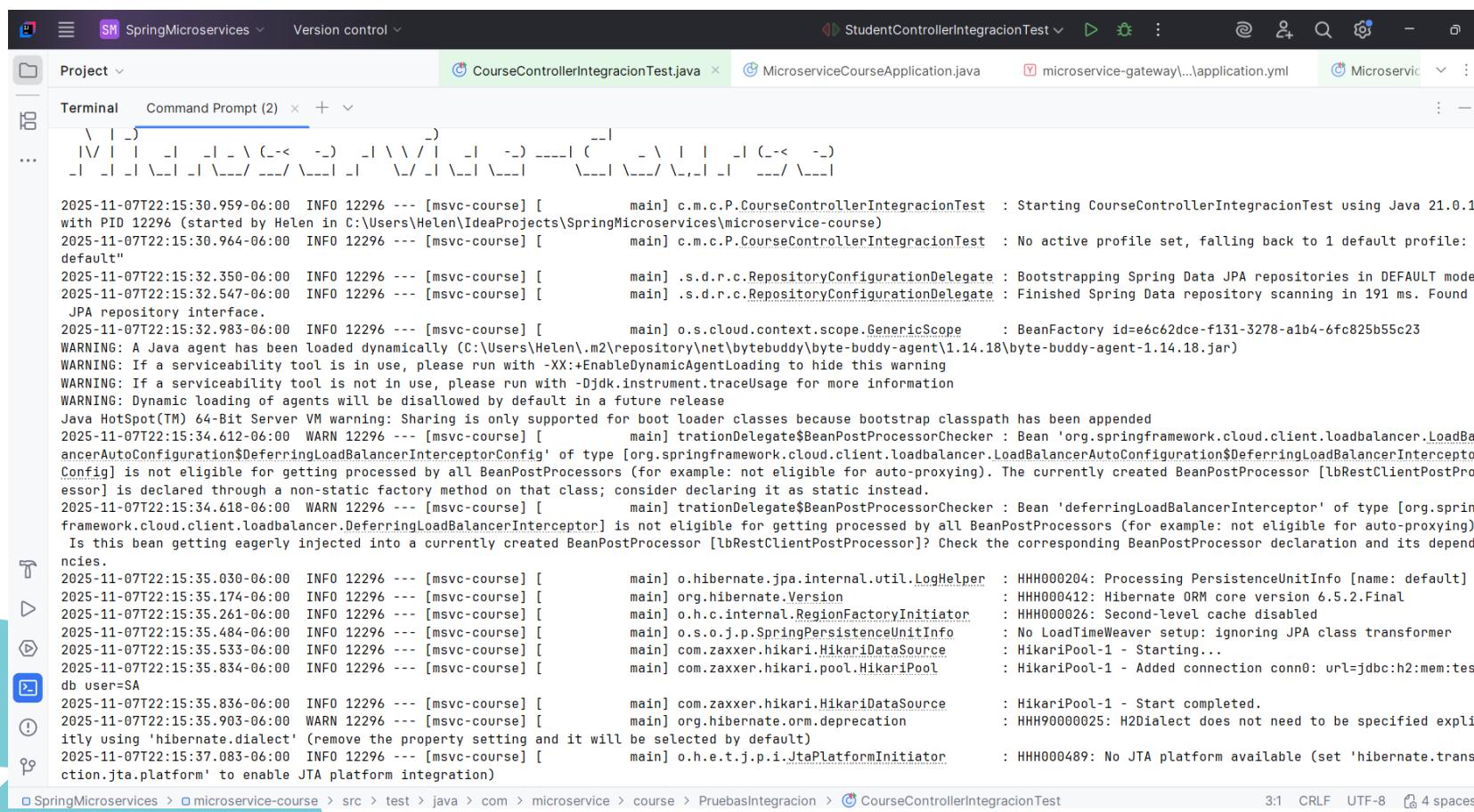


The image shows two side-by-side terminal windows from an IDE, likely IntelliJ IDEA, displaying the output of a Java application named "StudentControllerIntegrationTest". The left terminal window shows the initial setup and configuration logs, including the loading of Spring Boot context and various dependency configurations. The right terminal window shows the execution of the integration test, which runs successfully, indicated by green text output. Both terminals have tabs for "StudentControllerIntegrationTest.java", "StudentControllerTest.java", "StudentController.java", and "Student.java". The status bar at the bottom of both windows indicates they are running on "Windows" with "CRLF" line endings and "UTF-8" encoding.

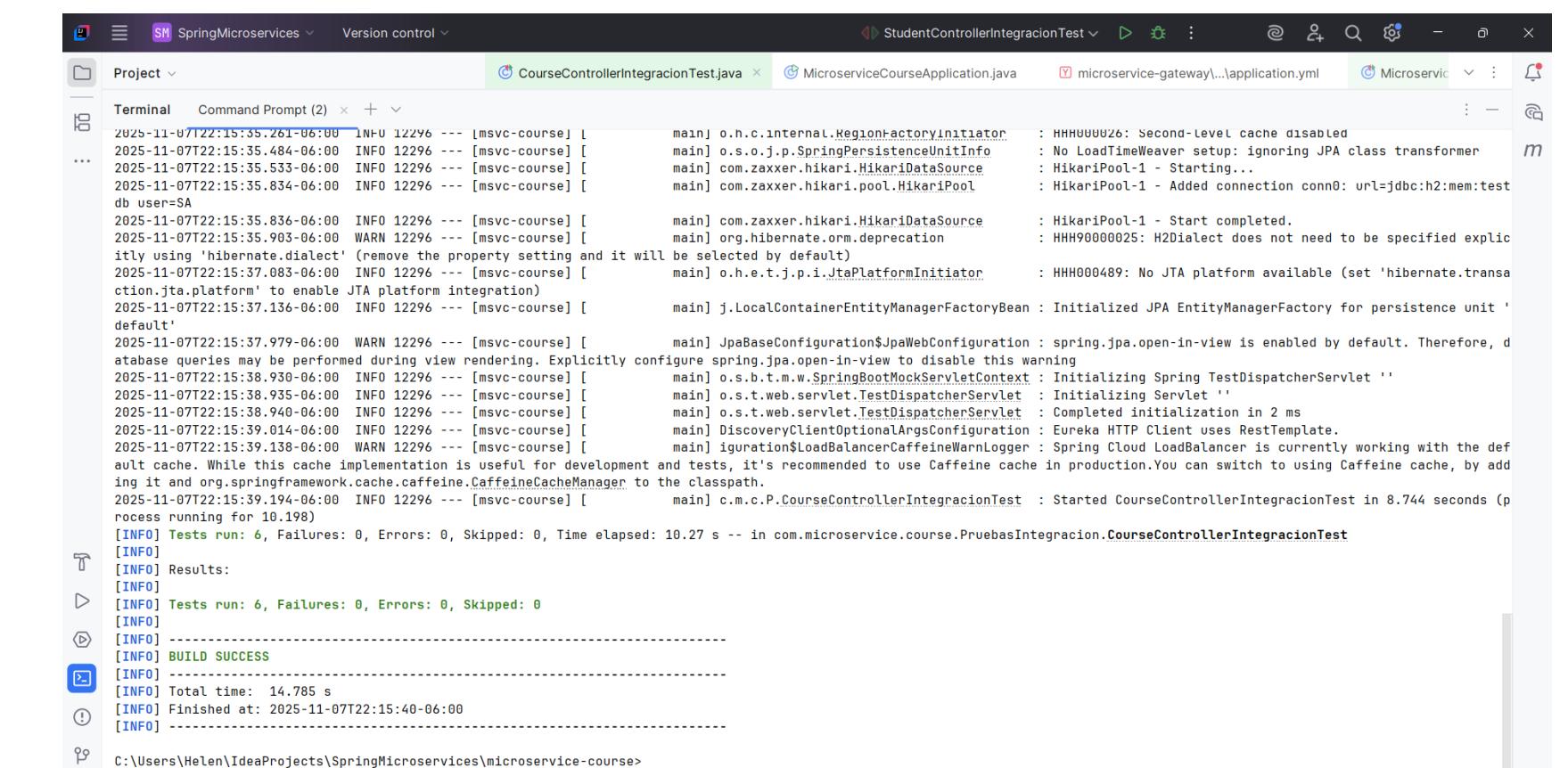
```
2025-11-07T22:03:30.068-06:00 INFO 19964 --- [main] b.t.c.SpringBootTestBootstrapper : Found @SpringBootConfiguration com.microservice.student.MicroserviceStudentApplication for test class com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest
2025-11-07T22:03:30.140-06:00 INFO 19964 --- [main] c.m.s.P.StudentControllerIntegrationTest : Starting StudentControllerIntegrationTest using Java 21.0.1 with PID 1996
4 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student)
2025-11-07T22:03:30.140-06:00 WARN 3272 --- [main] i.g.i.l.LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
2025-11-07T22:03:30.140-06:00 INFO 3272 --- [main] o.s.c.n.eureka.InstanceInfoFactory : Setting initial instance status as: STARTING
2025-11-07T22:03:30.140-06:00 INFO 3272 --- [main] com.netflix.discovery.DiscoveryClient : Initializing Eureka in region us-east-1
2025-11-07T22:03:30.140-06:00 INFO 3272 --- [main] com.netflix.discovery.DiscoveryClient : Client configured to neither register nor query for data.
2025-11-07T22:03:30.140-06:00 INFO 3272 --- [main] com.netflix.discovery.DiscoveryClient : Discovery Client initialized at timestamp 1762574654442 with initial instances count: 0
2025-11-07T22:03:30.140-06:00 INFO 3272 --- [main] o.s.c.n.e.s.EurekaServiceRegistry : Registering application UNKNOWN with eureka with status UP
2025-11-07T22:03:30.140-06:00 INFO 3272 --- [main] c.m.s.P.StudentControllerIntegrationTest : Started StudentControllerIntegrationTest in 9.736 seconds (process running for 11.158)
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.14.19\byte-buddy-agent-1.14.19.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 11.93 s -- in com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 16.508 s
[INFO] Finished at: 2025-11-07T22:04:16-06:00
[INFO] -----
```

Pruebas de integración course

Para comprobar que las pruebas de integración del microservicio Course se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Cuando se completan con éxito, los resultados se muestran en verde, confirmando que todo funciona correctamente.



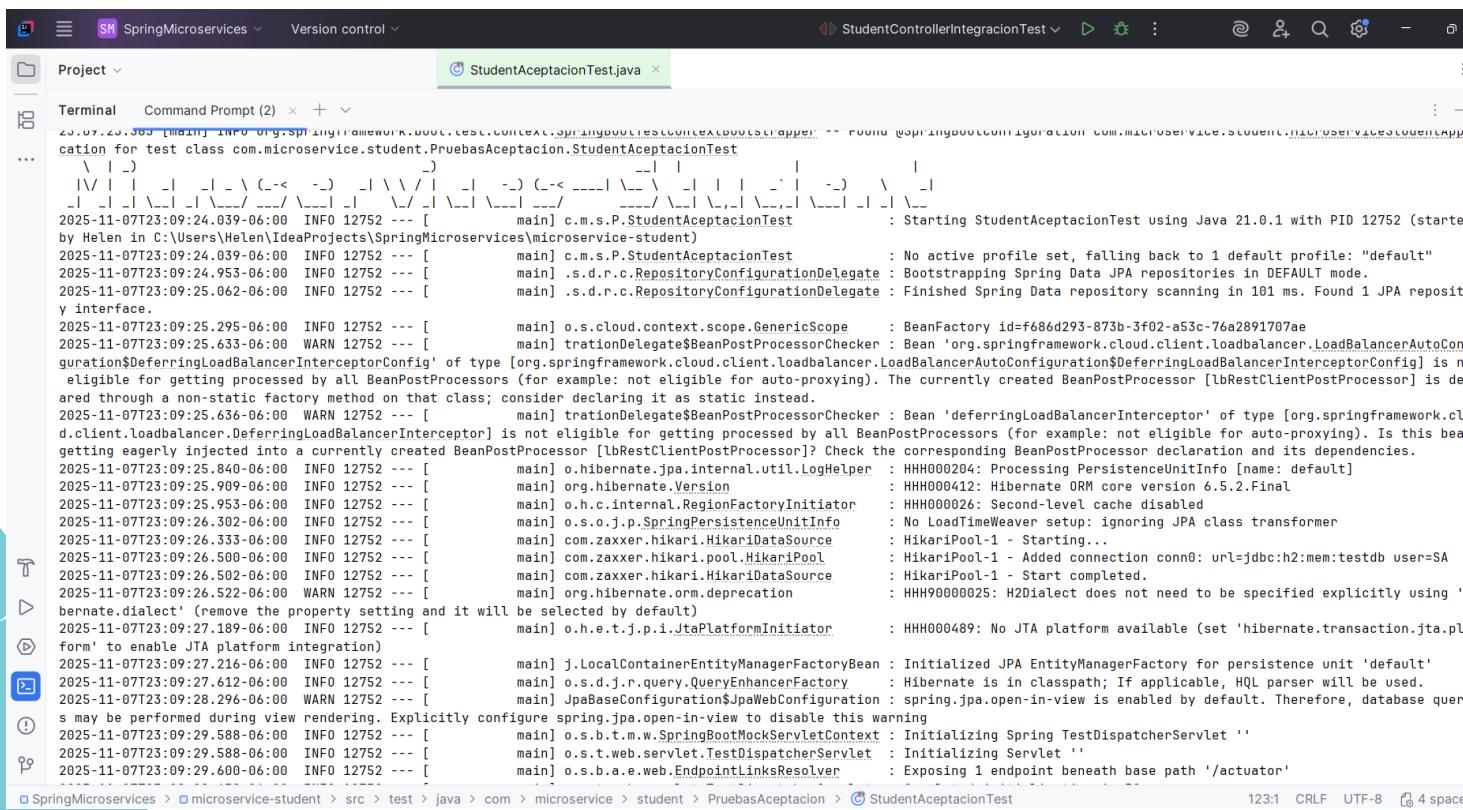
```
2025-11-07T22:15:30.959-06:00 INFO 12296 --- [msvc-course] [main] c.m.c.P.CourseControllerIntegracionTest : Starting CourseControllerIntegracionTest using Java 21.0.1 with PID 12296 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course)
2025-11-07T22:15:30.964-06:00 INFO 12296 --- [msvc-course] [main] c.m.c.P.CourseControllerIntegracionTest : No active profile set, falling back to 1 default profile: "default"
2025-11-07T22:15:32.350-06:00 INFO 12296 --- [msvc-course] [main] .s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-07T22:15:32.547-06:00 INFO 12296 --- [msvc-course] [main] .s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 191 ms. Found 1 JPA repository interface.
2025-11-07T22:15:32.983-06:00 INFO 12296 --- [msvc-course] [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=e6c62dce-f131-3278-a1b4-6fc825b55c23
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.14.18\byte-buddy-agent-1.14.18.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
2025-11-07T22:15:34.612-06:00 WARN 12296 --- [msvc-course] [main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-07T22:15:34.618-06:00 WARN 12296 --- [msvc-course] [main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean getting eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-07T22:15:35.030-06:00 INFO 12296 --- [msvc-course] [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T22:15:35.174-06:00 INFO 12296 --- [msvc-course] [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T22:15:35.261-06:00 INFO 12296 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHH00026: Second-level cache disabled
2025-11-07T22:15:35.484-06:00 INFO 12296 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:15:35.533-06:00 INFO 12296 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T22:15:35.834-06:00 INFO 12296 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T22:15:35.836-06:00 INFO 12296 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:15:35.903-06:00 WARN 12296 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH90000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:15:37.083-06:00 INFO 12296 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:15:37.136-06:00 INFO 12296 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:15:37.979-06:00 WARN 12296 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:15:38.930-06:00 INFO 12296 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:15:38.935-06:00 INFO 12296 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:15:38.940-06:00 INFO 12296 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 2 ms
2025-11-07T22:15:39.014-06:00 INFO 12296 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:15:39.138-06:00 WARN 12296 --- [msvc-course] [main] igration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache by adding it and org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-07T22:15:39.194-06:00 INFO 12296 --- [msvc-course] [main] c.m.c.P.CourseControllerIntegracionTest : Started CourseControllerIntegracionTest in 8.744 seconds (process running for 10.198)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 10.27 s -- in com.microservice.course.PruebasIntegracion.CourseControllerIntegracionTest
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 14.785 s
[INFO] Finished at: 2025-11-07T22:15:40-06:00
[INFO]
C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course>
```



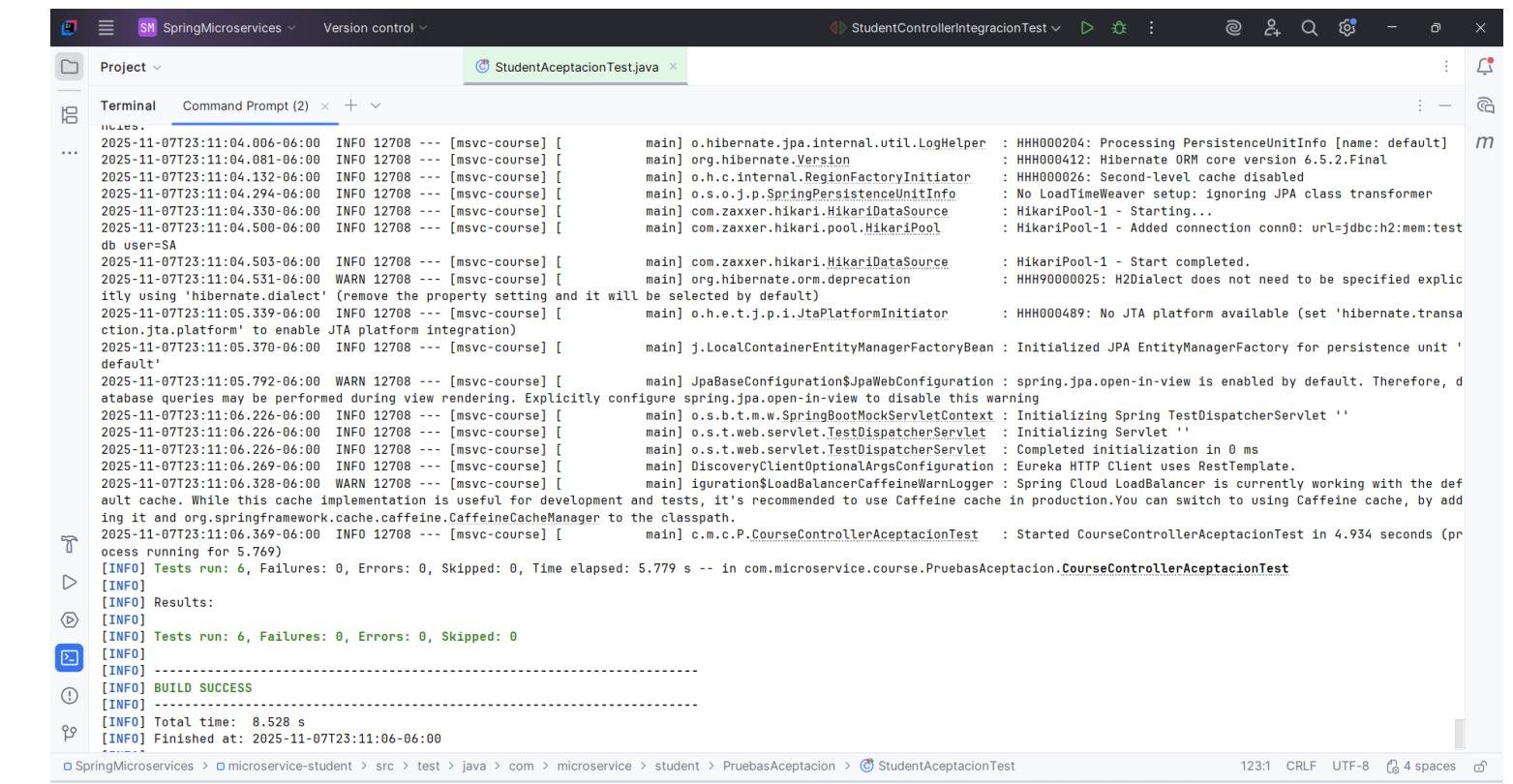
```
2025-11-07T22:15:35.261-06:00 INFO 12296 --- [msvc-course] [main] o.n.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T22:15:35.484-06:00 INFO 12296 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:15:35.533-06:00 INFO 12296 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T22:15:35.834-06:00 INFO 12296 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T22:15:35.836-06:00 INFO 12296 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:15:35.903-06:00 WARN 12296 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH90000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:15:37.083-06:00 INFO 12296 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:15:37.136-06:00 INFO 12296 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:15:37.979-06:00 WARN 12296 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:15:38.930-06:00 INFO 12296 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:15:38.935-06:00 INFO 12296 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:15:38.940-06:00 INFO 12296 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:15:39.138-06:00 WARN 12296 --- [msvc-course] [main] igration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache by adding it and org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-07T22:15:39.194-06:00 INFO 12296 --- [msvc-course] [main] c.m.c.P.CourseControllerIntegracionTest : Started CourseControllerIntegracionTest in 8.744 seconds (process running for 10.198)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 10.27 s -- in com.microservice.course.PruebasIntegracion.CourseControllerIntegracionTest
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 14.785 s
[INFO] Finished at: 2025-11-07T22:15:40-06:00
[INFO]
C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course>
```

Pruebas de aceptación student

Para comprobar que las pruebas de aceptación del microservicio Student se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Cuando se completan exitosamente, los resultados se muestran en verde, indicando que todo funciona como se espera.

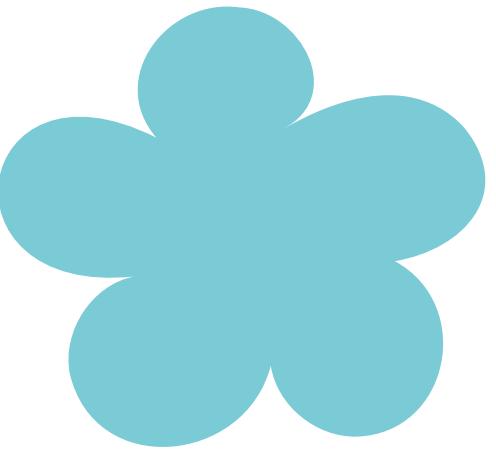


```
2025-11-07T23:09:24.039+06:00 INFO 12752 --- [main] c.m.s.P.StudentAceptacionTest : Starting StudentAceptacionTest using Java 21.0.1 with PID 12752 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student)
2025-11-07T23:09:24.039+06:00 INFO 12752 --- [main] c.m.s.P.StudentAceptacionTest : No active profile set, falling back to 1 default profile: "default"
2025-11-07T23:09:24.039+06:00 INFO 12752 --- [main] s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-07T23:09:25.062+06:00 INFO 12752 --- [main] s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 101 ms. Found 1 JPA repository interface.
2025-11-07T23:09:25.295+06:00 INFO 12752 --- [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=f686d293-873b-3f02-a53c-76a289170ae
2025-11-07T23:09:25.633+06:00 WARN 12752 --- [main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-07T23:09:25.636+06:00 WARN 12752 --- [main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean getting eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-07T23:09:25.840+06:00 INFO 12752 --- [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T23:09:25.909+06:00 INFO 12752 --- [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T23:09:25.953+06:00 INFO 12752 --- [main] o.h.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T23:09:26.302+06:00 INFO 12752 --- [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T23:09:26.355+06:00 INFO 12752 --- [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T23:09:26.500+06:00 INFO 12752 --- [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T23:09:26.502+06:00 INFO 12752 --- [main] org.hibernate.orm.deprecation : HikariPool-1 - Start completed.
2025-11-07T23:09:26.522+06:00 WARN 12752 --- [main] org.hibernate.orm.deprecation : HHH00000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T23:09:27.189+06:00 INFO 12752 --- [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T23:09:27.216+06:00 INFO 12752 --- [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T23:09:27.612+06:00 INFO 12752 --- [main] o.s.d.j.r.QueryEnhancerFactory : Hibernate is in classpath; If applicable, HQL parser will be used.
2025-11-07T23:09:28.296+06:00 WARN 12752 --- [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T23:09:29.588+06:00 INFO 12752 --- [main] o.s.b.m.w.SpringBootTestServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T23:09:29.588+06:00 INFO 12752 --- [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T23:09:29.600+06:00 INFO 12752 --- [main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 1 endpoint beneath base path '/actuator'
```

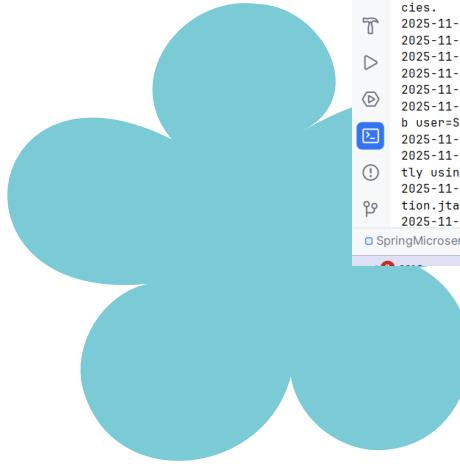


```
2025-11-07T23:11:04.006+06:00 INFO 12708 --- [msvc-course] [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T23:11:04.081+06:00 INFO 12708 --- [msvc-course] [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T23:11:04.132+06:00 INFO 12708 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T23:11:04.294+06:00 INFO 12708 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T23:11:04.350+06:00 INFO 12708 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T23:11:04.500+06:00 INFO 12708 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T23:11:04.531+06:00 WARN 12708 --- [msvc-course] [main] org.hibernate.orm.deprecation : HikariPool-1 - Start completed.
2025-11-07T23:11:05.339+06:00 INFO 12708 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T23:11:05.370+06:00 INFO 12708 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T23:11:05.792+06:00 WARN 12708 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T23:11:06.226+06:00 INFO 12708 --- [msvc-course] [main] o.s.b.t.n.w.SpringBootTestServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T23:11:06.226+06:00 INFO 12708 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T23:11:06.226+06:00 INFO 12708 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 0 ms
2025-11-07T23:11:06.269+06:00 INFO 12708 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T23:11:06.328+06:00 WARN 12708 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache, by adding it and org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-07T23:11:06.369+06:00 INFO 12708 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 4.934 seconds (process running for 5.769)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 5.779 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 8.528 s
[INFO] Finished at: 2025-11-07T23:11:06-06:00
[INFO]
```

Pruebas de aceptación course



Para asegurarnos de que las pruebas de aceptación del microservicio Course se ejecuten correctamente, se emplean comandos que permiten correr los tests. Al completarse con éxito, los resultados se muestran en verde, confirmando que todo funciona correctamente.



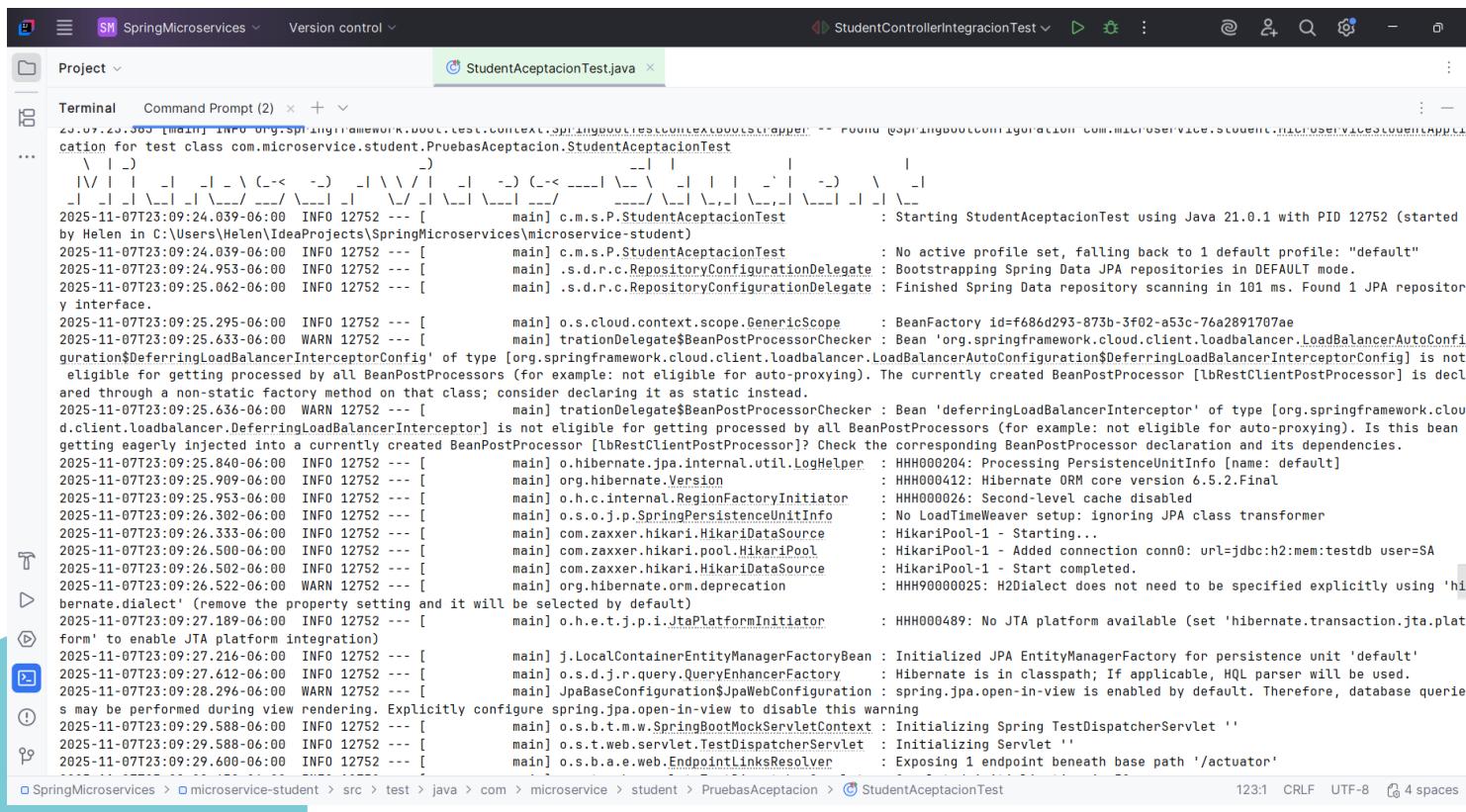
```
Project Terminal Command Prompt (2) CourseControllerAceptacionTest.java
...
2025-11-07T22:54:59.199-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Starting CourseControllerAceptacionTest using Java 21.0.1 with PID 5864 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course)
2025-11-07T22:54:59.214-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : No active profile set, falling back to 1 default profile: "default"
2025-11-07T22:55:00.023-06:00 INFO 5864 --- [msvc-course] [main] s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-07T22:55:00.184-06:00 INFO 5864 --- [msvc-course] [main] s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 149 ms. Found 1 JPA repository interface.
2025-11-07T22:55:00.444-06:00 INFO 5864 --- [msvc-course] [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=e6c62dce-f131-3278-a1b4-6fc825b55c23
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.14.18\byte-buddy-agent-1.14.18.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning.
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
2025-11-07T22:55:01.602-06:00 WARN 5864 --- [msvc-course] [main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalanceAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-07T22:55:01.610-06:00 WARN 5864 --- [msvc-course] [main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean being eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-07T22:55:01.822-06:00 INFO 5864 --- [msvc-course] [main] o.hibernate.jpa.internal.util.LogHelper : HHHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T22:55:01.925-06:00 INFO 5864 --- [msvc-course] [main] org.hibernate.Version : HHHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T22:55:01.975-06:00 INFO 5864 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHHH000026: Second-level cache disabled
2025-11-07T22:55:02.122-06:00 INFO 5864 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:55:02.155-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikaridDataSource : HikariPool-1 - Starting...
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb;user=SA
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:55:02.493-06:00 WARN 5864 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:55:03.350-06:00 INFO 5864 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:55:03.384-06:00 INFO 5864 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:55:03.834-06:00 WARN 5864 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:55:04.341-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 1 ms
2025-11-07T22:55:04.371-06:00 INFO 5864 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:55:04.426-06:00 WARN 5864 --- [msvc-course] [main] igrationLoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
2025-11-07T22:55:04.465-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 5.576 seconds (process running for 6.562)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 6.592 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 11.321 s
[INFO] Finished at: 2025-11-07T22:55:05-06:00
[INFO]
[INFO] C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course
```



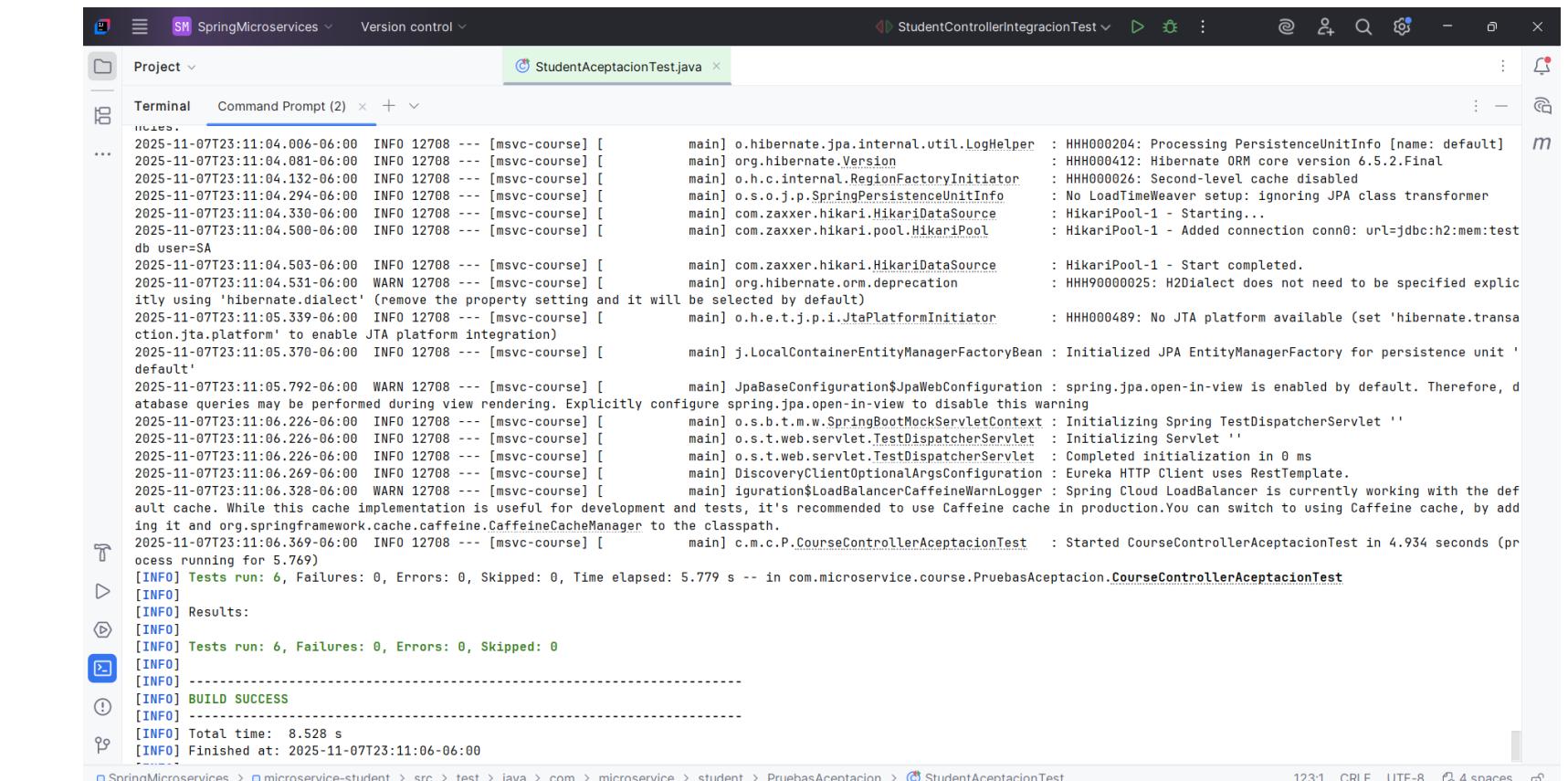
```
Project Terminal Command Prompt (2) CourseControllerAceptacionTest.java
...
2025-11-07T22:55:04.371-06:00 INFO 5864 --- [msvc-course] [main] o.n.c.internal.RegionFactoryInitiator : HHHH000026: Second-level cache disabled
2025-11-07T22:55:02.122-06:00 INFO 5864 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:55:02.155-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikaridDataSource : HikariPool-1 - Starting...
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb;user=SA
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:55:02.493-06:00 WARN 5864 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:55:03.350-06:00 INFO 5864 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:55:03.384-06:00 INFO 5864 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:55:03.834-06:00 WARN 5864 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:55:04.341-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 1 ms
2025-11-07T22:55:04.371-06:00 INFO 5864 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:55:04.426-06:00 WARN 5864 --- [msvc-course] [main] igrationLoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
2025-11-07T22:55:04.465-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 5.576 seconds (process running for 6.562)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 6.592 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 11.321 s
[INFO] Finished at: 2025-11-07T22:55:05-06:00
[INFO]
[INFO] C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course
```

Pruebas de seguridad student

Para asegurarnos de que las pruebas de seguridad del microservicio Student se ejecuten correctamente, se utilizan comandos que permiten correr los tests. Cuando se completan exitosamente, los resultados se muestran en verde, indicando que todo funciona correctamente.



```
2025-11-07T23:09:24.039+06:00 INFO 12752 --- [main] c.m.s.P.StudentAceptacionTest : Starting StudentAceptacionTest using Java 21.0.1 with PID 12752 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student)
2025-11-07T23:09:24.039+06:00 INFO 12752 --- [main] c.m.s.P.StudentAceptacionTest : No active profile set, falling back to 1 default profile: "default"
2025-11-07T23:09:24.953+06:00 INFO 12752 --- [main] .s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-07T23:09:25.062+06:00 INFO 12752 --- [main] .s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 101 ms. Found 1 JPA repository interface.
2025-11-07T23:09:25.295+06:00 INFO 12752 --- [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=f686d293-873b-3f02-a53c-76a2891707a
2025-11-07T23:09:25.633+06:00 WARN 12752 --- [main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-07T23:09:25.636+06:00 WARN 12752 --- [main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean getting eagerly injected into the currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-07T23:09:25.909+06:00 INFO 12752 --- [main] o.hibernate.jpa.internal.util.LogHelper : HHH000042: Hibernate ORM core version 6.5.2.Final
2025-11-07T23:09:25.953+06:00 INFO 12752 --- [main] o.h.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T23:09:26.333+06:00 INFO 12752 --- [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T23:09:26.500+06:00 INFO 12752 --- [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T23:09:26.502+06:00 INFO 12752 --- [main] org.hibernate.orm.deprecation : HikariPool-1 - Start completed.
2025-11-07T23:09:26.522+06:00 WARN 12752 --- [main] org.hibernate.orm.deprecation : HHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T23:09:27.187+06:00 INFO 12752 --- [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH0000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T23:09:27.216+06:00 INFO 12752 --- [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T23:09:27.612+06:00 INFO 12752 --- [main] o.s.d.j.r.QueryEnhancerFactory : Hibernate is in classpath; If applicable, HQL parser will be used.
2025-11-07T23:09:28.296+06:00 WARN 12752 --- [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. This may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T23:09:29.588+06:00 INFO 12752 --- [main] o.s.t.m.w.SpringBootMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T23:09:29.588+06:00 INFO 12752 --- [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T23:09:29.600+06:00 INFO 12752 --- [main] o.s.b.a.e.web.EndpointLinksResolver : Exposing 1 endpoint beneath base path '/actuator'
```

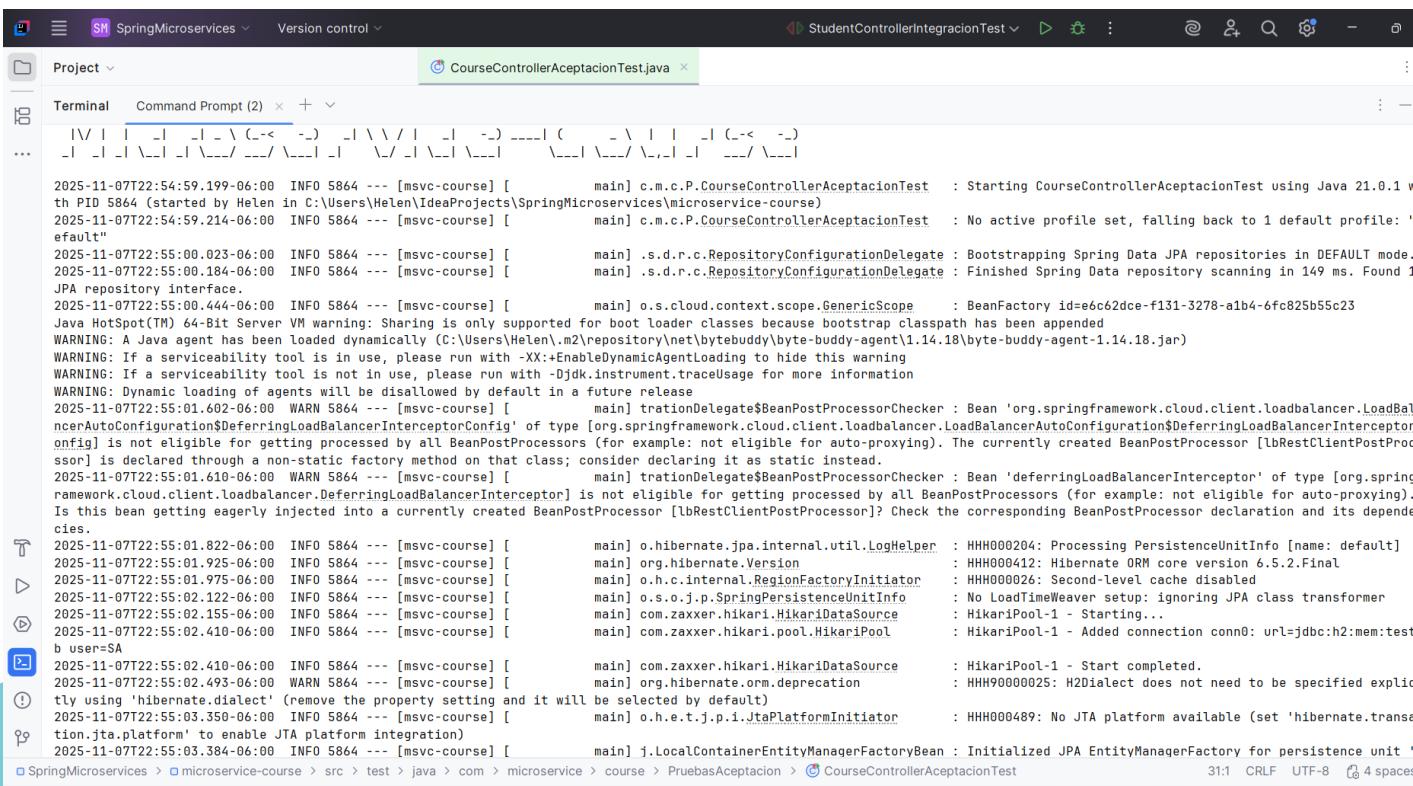


```
2025-11-07T23:11:04.006+06:00 INFO 12708 --- [msvc-course] [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T23:11:04.081+06:00 INFO 12708 --- [msvc-course] [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T23:11:04.132+06:00 INFO 12708 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T23:11:04.294+06:00 INFO 12708 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T23:11:04.330+06:00 INFO 12708 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T23:11:04.500+06:00 INFO 12708 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T23:11:04.503+06:00 INFO 12708 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T23:11:04.531+06:00 WARN 12708 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T23:11:05.339+06:00 INFO 12708 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T23:11:05.370+06:00 INFO 12708 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T23:11:05.792+06:00 WARN 12708 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T23:11:06.226+06:00 INFO 12708 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T23:11:06.226+06:00 INFO 12708 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T23:11:06.226+06:00 INFO 12708 --- [msvc-course] [main] o.s.t.w.servlet.TestDispatcherServlet : Completed initialization in 0 ms
2025-11-07T23:11:06.269+06:00 INFO 12708 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T23:11:06.328+06:00 INFO 12708 --- [msvc-course] [main] i.guration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
2025-11-07T23:11:06.369+06:00 INFO 12708 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 4.934 seconds (process running for 5.769)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 5.779 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO]
[INFO] -----
[INFO] Total time: 8.528 s
[INFO] Finished at: 2025-11-07T23:11:06+06:00

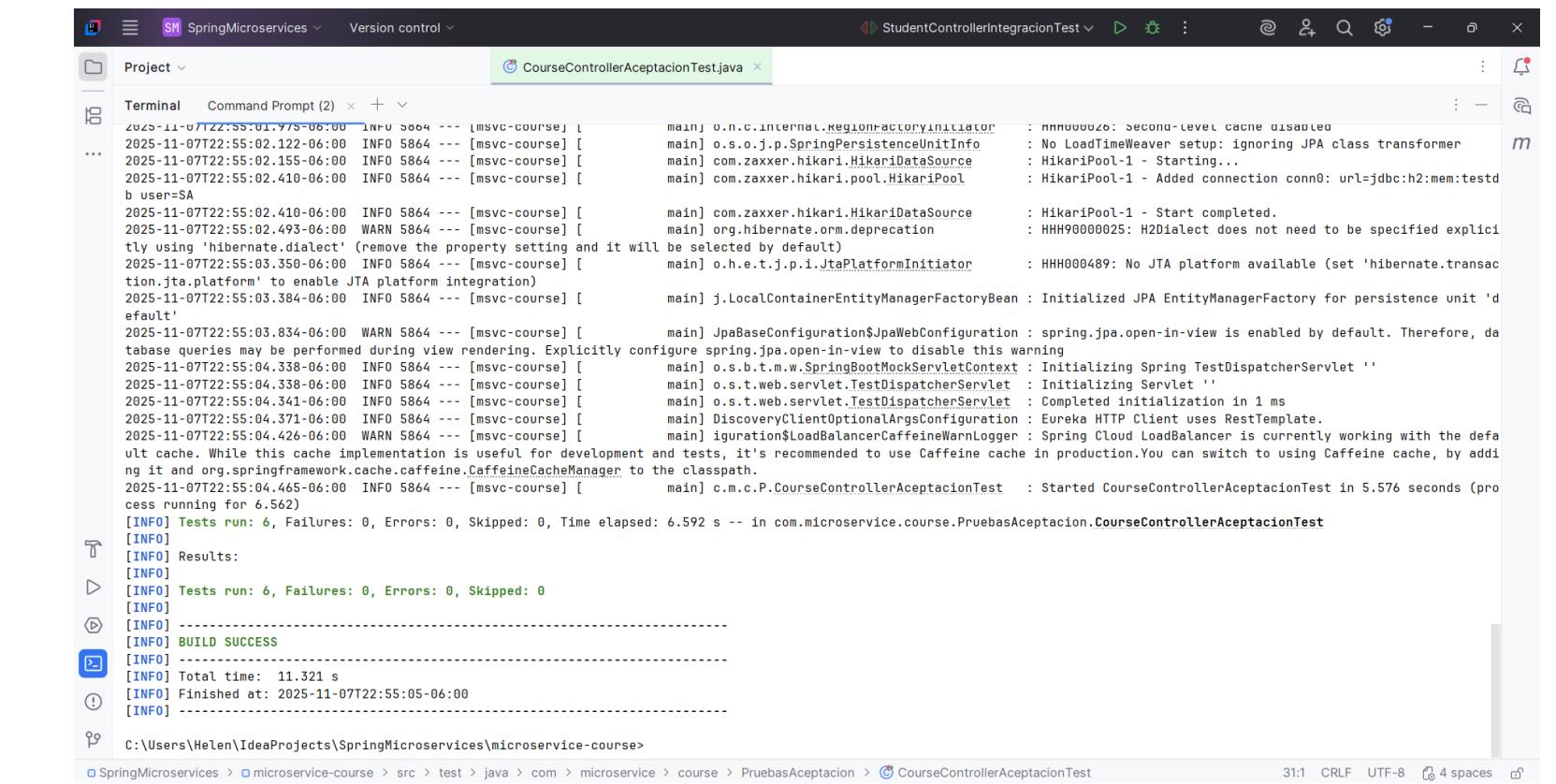
```

Pruebas de seguridad course

Para asegurarnos de que las pruebas de seguridad del microservicio Course se ejecuten correctamente, se utilizan comandos que permiten correr los tests. Al completarse con éxito, los resultados se muestran en verde, confirmando que todo funciona correctamente.



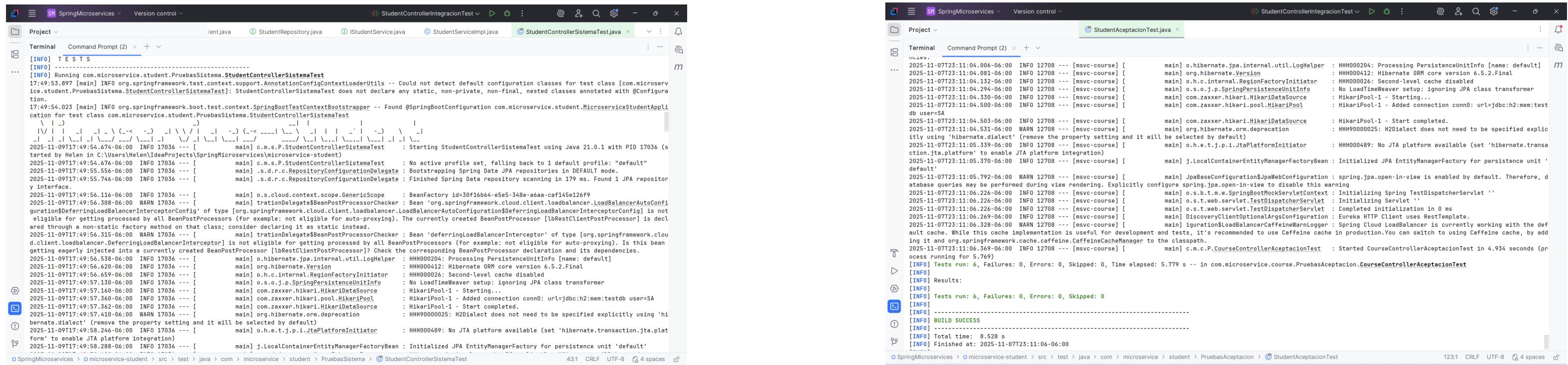
```
2025-11-07T22:54:59.199-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Starting CourseControllerAceptacionTest using Java 21.0.1 w/ PID 5864 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course)
2025-11-07T22:54:59.214-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : No active profile set, falling back to 1 default profile: "default"
2025-11-07T22:55:03-06:00 INFO 5864 --- [msvc-course] [main] .s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-07T22:55:00.184-06:00 INFO 5864 --- [msvc-course] [main] .s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 149 ms. Found 1 JPA repository interface.
2025-11-07T22:55:00.444-06:00 INFO 5864 --- [msvc-course] [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=e6c62dce-f131-3278-a1b4-6fc825b55c23
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\netbytebuddy\byte-buddy-agent\1.14.18\byte-buddy-agent-1.14.18.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disabled by default in a future release
2025-11-07T22:55:01.602-06:00 WARN 5864 --- [main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting selected by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-07T22:55:01.610-06:00 WARN 5864 --- [msvc-course] [main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting selected by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean getting eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-07T22:55:01.822-06:00 INFO 5864 --- [msvc-course] [main] o.hibernate.jpa.internal.util.LogHelper : HHH0000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T22:55:01.925-06:00 INFO 5864 --- [msvc-course] [main] org.hibernate.Version : HHH0000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T22:55:01.975-06:00 INFO 5864 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T22:55:02.122-06:00 INFO 5864 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:55:02.155-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:55:02.493-06:00 WARN 5864 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:55:03.350-06:00 INFO 5864 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:55:03.384-06:00 INFO 5864 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:55:03.834-06:00 WARN 5864 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:55:04.341-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 1 ms
2025-11-07T22:55:04.371-06:00 INFO 5864 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:55:04.426-06:00 WARN 5864 --- [msvc-course] [main] igration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-07T22:55:04.465-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 5.576 seconds (process running for 6.562)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 6.592 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 11.321 s
[INFO] Finished at: 2025-11-07T22:55:05-06:00
[INFO] -----
```



```
2025-11-07T22:55:05.01.975-06:00 INFO 5864 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T22:55:05.02.122-06:00 INFO 5864 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:55:05.02.155-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T22:55:05.02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T22:55:05.02.410-06:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:55:05.02.493-06:00 WARN 5864 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:55:03.350-06:00 INFO 5864 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:55:03.384-06:00 INFO 5864 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:55:03.834-06:00 WARN 5864 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:55:04.341-06:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 1 ms
2025-11-07T22:55:04.371-06:00 INFO 5864 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:55:04.426-06:00 WARN 5864 --- [msvc-course] [main] igration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-07T22:55:04.465-06:00 INFO 5864 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 5.576 seconds (process running for 6.562)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 6.592 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 11.321 s
[INFO] Finished at: 2025-11-07T22:55:05-06:00
[INFO] -----
```

Pruebas de sistema student

Para comprobar que las pruebas de sistema del microservicio Student se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Cuando se completan exitosamente, los resultados se muestran en verde, indicando que todo funciona como se espera.



The image shows two side-by-side terminal windows from a Spring IDE. Both terminals are titled "Command Prompt (2)".

Left Terminal (StudentControllerSistemaTest):

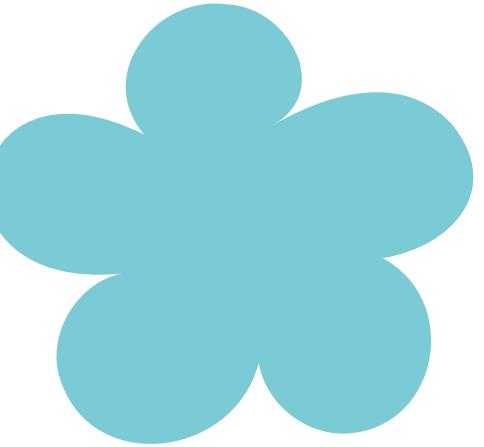
```
[INFO] T E S T S
[INFO] -----
[INFO] Running com.microservice.student.PruebasSistema.StudentControllerSistemaTest
17:49:53.897 [main] INFO org.springframework.test.context.support.AnnotationConfigContextLoaderUtils -- Could not detect default configuration classes for test class [com.microservice.student.PruebasSistema.StudentControllerSistemaTest]: StudentControllerSistemaTest does not declare any static, non-private, non-final, nested classes annotated with @Configuration.
17:49:54.023 [main] INFO org.springframework.boot.test.context.SpringBootTestTestContextBootstrapper -- Found @SpringBootConfiguration com.microservice.student.MicroserviceStudentApplication for test class com.microservice.student.PruebasSistema.StudentControllerSistemaTest
...
2025-11-09T17:49:54.674-06:00 INFO 17036 --- [main] c.m.s.P.StudentControllerSistemaTest : Starting StudentControllerSistemaTest using Java 21.0.1 with PID 17036 (started by Helen in C:\Users\HelenIdeaProjects\SpringMicroservices\microservice-student)
2025-11-09T17:49:55.676-06:00 INFO 17036 --- [main] c.m.s.P.StudentControllerSistemaTest : No active profile set, falling back to 1 default profile: "default"
2025-11-09T17:49:55.556-06:00 INFO 17036 --- [main] o.s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-09T17:49:55.746-06:00 INFO 17036 --- [main] o.s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 179 ms. Found 1 JPA repository interface.
2025-11-09T17:49:56.116-06:00 INFO 17036 --- [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=30f16b64-e5e5-348e-a6aa-caf145e126f9
2025-11-09T17:49:56.308-06:00 WARN 17036 --- [main] trationDelegates$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalanceAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-09T17:49:56.315-06:00 WARN 17036 --- [main] trationDelegates$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean getting eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-09T17:49:56.538-06:00 INFO 17036 --- [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-09T17:49:56.620-06:00 INFO 17036 --- [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-09T17:49:56.659-06:00 INFO 17036 --- [main] o.h.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-09T17:49:57.130-06:00 INFO 17036 --- [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-09T17:49:57.160-06:00 INFO 17036 --- [main] com.zxxer.hikaricp.HikariDataSource : HikariPool-1 - Starting...
2025-11-09T17:49:57.360-06:00 INFO 17036 --- [main] com.zxxer.hikaricp.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-09T17:49:57.362-06:00 INFO 17036 --- [main] com.zxxer.hikaricp.HikariDataSource : HikariPool-1 - Start completed.
2025-11-09T17:49:57.410-06:00 WARN 17036 --- [main] org.hibernate.orm.deprecation : H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-09T17:49:58.246-06:00 INFO 17036 --- [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-09T17:49:58.288-06:00 INFO 17036 --- [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
```

Right Terminal (StudentAceptacionTest):

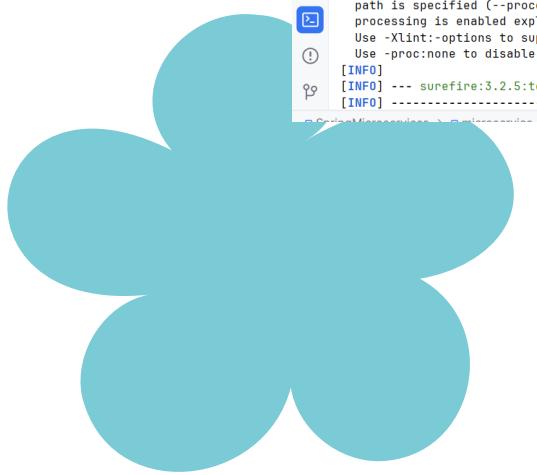
```
2025-11-07T23:11:04.086-06:00 INFO 12708 --- [msvc-course] [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-07T23:11:04.081-06:00 INFO 12708 --- [msvc-course] [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-07T23:11:04.152-06:00 INFO 12708 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHH000026: Second-level cache disabled
2025-11-07T23:11:04.294-06:00 INFO 12708 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T23:11:04.350-06:00 INFO 12708 --- [msvc-course] [main] com.zxxer.hikaricp.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T23:11:04.500-06:00 INFO 12708 --- [msvc-course] [main] com.zxxer.hikaricp.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-07T23:11:04.531-06:00 INFO 12708 --- [msvc-course] [main] com.zxxer.hikaricp.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T23:11:04.531-06:00 WARN 12708 --- [msvc-course] [main] org.hibernate.orm.deprecation : H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T23:11:05.359-06:00 INFO 12708 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T23:11:05.370-06:00 INFO 12708 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T23:11:05.792-06:00 WARN 12708 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T23:11:06.226-06:00 INFO 12708 --- [msvc-course] [main] o.s.b.f.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T23:11:06.226-06:00 INFO 12708 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T23:11:06.226-06:00 INFO 12708 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 0 ms
2025-11-07T23:11:06.369-06:00 INFO 12708 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T23:11:06.369-06:00 WARN 12708 --- [msvc-course] [main] Ignigation$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default implementation. This current implementation is useful for development and tests, it's recommended to use Caffeine cache, by adding it and org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-07T23:11:06.369-06:00 INFO 12708 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 4.934 seconds (process time)
2025-11-07T23:11:06.369-06:00 INFO 12708 --- [msvc-course] [main] c.m.c.P.CourseControllerAceptacionTest : Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 5.779 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO] Results:
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO] BUILD SUCCESS
[INFO] Total time: 8.528 s
[INFO] Finished at: 2025-11-07T23:11:06:06-06:00

```

Pruebas de sistema course



Para comprobar que las pruebas de sistema del microservicio Course se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Al completarse con éxito, los resultados se muestran en verde, confirmando que todo funciona correctamente.



Screenshot of the IntelliJ IDEA interface showing the terminal output for running system tests. The command run is `mvn test -Dtest=CourseSystemTest`. The output shows the Maven build process, including compilation and test execution, with no errors or failures.

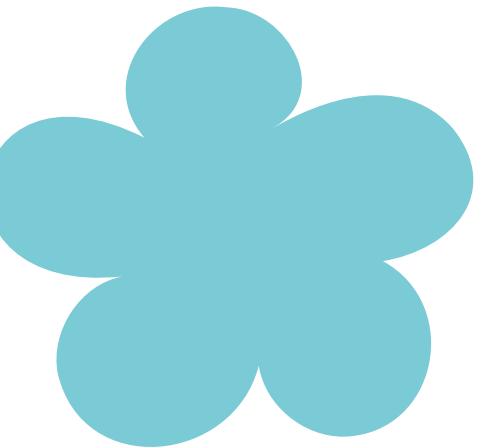
```
Terminal  Command Prompt x + v
...
C:\Users\Helen\IdeaProjects\SpringMicroservices>cd microservice-course
C:\Users\Helen\IdeaProjects\SpringMicroservices>mvn test -Dtest=CourseSystemTest
[INFO] Scanning for projects...
[INFO] ...
[INFO] --- com.microservice:microservice-course:0.0.1-SNAPSHOT
[INFO] Building microservice-course 0.0.1-SNAPSHOT
[INFO] from pom.xml
[INFO] ...
[INFO] --- [jar] ---
[INFO] --- resources:3.3.1:resources (default-resources) @ microservice-course ---
[INFO] Copying 1 resource from src/main/resources to target\classes
[INFO] Copying 2 resources from src\main\resources to target\classes
[INFO] ...
[INFO] --- compiler:3.13.0:compile (default-compile) @ microservice-course ---
[INFO] Nothing to compile - all classes are up to date.
[INFO] ...
[INFO] --- resources:3.3.1:testResources (default-testResources) @ microservice-course ---
[INFO] skip non existing resourceDirectory C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course\src\test\resources
[INFO] ...
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ microservice-course ---
[INFO] Recompiling the module because of changed source code
[INFO] Compiling 5 source files with javac [debug parameters release 17] to target\test-classes
[INFO] Annotation processing is enabled because one or more processors were found
on the class path. A future release of Java may disable annotation processing
unless at least one processor is specified by name (-processor), or a search
path is specified (-processor-path, --processor-module-path), or annotation
processing is enabled explicitly (-proc:only, -proc:full).
Use -Xlint:options to suppress this message.
Use -proc:none to disable annotation processing.
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ microservice-course ---
[INFO]
```



Screenshot of the IntelliJ IDEA interface showing the terminal output for running acceptance tests. The command run is `mvn test -Dtest=CourseControllerAceptacionTest`. The output shows the Maven build process, including compilation and test execution, with no errors or failures, indicating successful execution.

```
Terminal  Command Prompt (2) x + v
...
2025-11-07T22:55:02.493+00:00 INFO 5864 --- [msvc-course] [main] o.s.c.internet.RegionFactoryInitiator : mnuuuuu0o: Second-level cache disabled
2025-11-07T22:55:02.493+00:00 INFO 5864 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-07T22:55:02.493+00:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...
2025-11-07T22:55:02.493+00:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb
2025-11-07T22:55:02.493+00:00 INFO 5864 --- [msvc-course] [main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.
2025-11-07T22:55:02.493+00:00 WARN 5864 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH00000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-07T22:55:03.350+00:00 INFO 5864 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-07T22:55:03.384+00:00 INFO 5864 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:55:03.834+00:00 WARN 5864 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:55:04.338+00:00 INFO 5864 --- [msvc-course] [main] o.s.b.t.m.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:55:04.338+00:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:55:04.341+00:00 INFO 5864 --- [msvc-course] [main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 1 ms
2025-11-07T22:55:04.371+00:00 INFO 5864 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:55:04.426+00:00 WARN 5864 --- [msvc-course] [main] Ignigation$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.Caffeine.CaffeineCacheManager to the classpath.
2025-11-07T22:55:04.465+00:00 INFO 5864 --- [msvc-course] [main] c.m.C.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 5.576 seconds (process running for 6.562)
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 6.592 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest
[INFO] Results:
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] BUILD SUCCESS
[INFO] Total time: 11.321 s
[INFO] Finished at: 2025-11-07T22:55:05-06:00
[INFO]
```

Pruebas de rendimiento student



Para comprobar que las pruebas de rendimiento del microservicio Student se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Cuando se completan exitosamente, los resultados se muestran en verde, indicando que el servicio cumple con los tiempos de respuesta esperados.

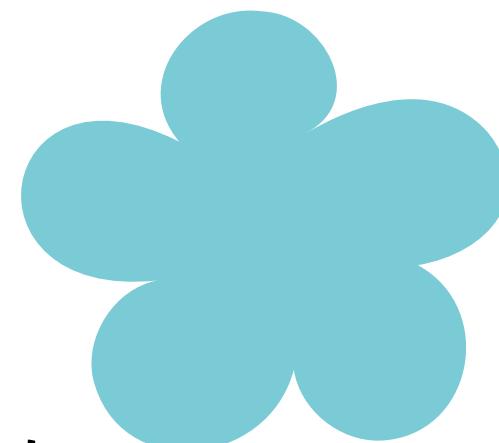
The screenshot shows a Java IDE interface with multiple tabs open. The tabs include 'StudentServiceImpl.java', 'StudentControllerSistemaTest.java', 'StudentRendimientoTest.java' (which is the active tab), and 'StudentControllerUsabilidadTest.java'. The terminal window displays the following output:

```
[INFO] TESTS
[INFO]
[INFO] Running com.microservice.student.PruebasRendimientoUsabilidad.StudentRendimientoTest
18:01:42.963 [main] INFO org.springframework.test.context.support.AnnotationConfigContextLoaderUtils -- Could not detect default configuration classes for test class [com.microservice.student.PruebasRendimientoUsabilidad.StudentRendimientoTest]: StudentRendimientoTest does not declare any static, non-private, non-final, nested classes annotated with @Configuration.
18:01:43.100 [main] INFO org.springframework.boot.test.context.SpringBootTestBootstrapper -- Found @SpringBootTestConfiguration com.microservice.student.MicroserviceStudentApplication for test class com.microservice.student.PruebasRendimientoUsabilidad.StudentRendimientoTest
    \ | -)
   \| | | -| -| -\ (<- -) -\ | \ / | -| -) (-< -| \ \ -| | -| -) \ | |
   -| -| -\ \ -| \ \ / -| / \ -| \ \ -| -| -| -| \ -| \ -| -| -| -| \ -|
2025-11-09T18:01:43.628-06:00 INFO 16528 --- [           main] c.m.s.P.StudentRendimientoTest        : Starting StudentRendimientoTest using Java 21.0.1 with PID 16528 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student)
2025-11-09T18:01:43.628-06:00 INFO 16528 --- [           main] c.m.s.P.StudentRendimientoTest        : No active profile set, falling back to 1 default profile: "default"
2025-11-09T18:01:44.514-06:00 INFO 16528 --- [           main] s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-09T18:01:44.672-06:00 INFO 16528 --- [           main] s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 146 ms. Found 1 JPA repository interface.
2025-11-09T18:01:45.008-06:00 INFO 16528 --- [           main] o.s.cloud.context.scope.GenericScope     : BeanFactory id=30f16b64-e5e5-348e-a6aa-caf145e126f9
2025-11-09T18:01:45.211-06:00 WARN 16528 --- [           main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-09T18:01:45.221-06:00 WARN 16528 --- [           main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean getting eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-09T18:01:45.542-06:00 INFO 16528 --- [           main] o.h.license.jpa.internal.util.LogHelper  : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-09T18:01:45.615-06:00 INFO 16528 --- [           main] org.hibernate.Version                  : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-09T18:01:45.665-06:00 INFO 16528 --- [           main] o.h.c.internal.RegionFactoryInitiator : HHH000262: Second-level cache disabled
2025-11-09T18:01:46.101-06:00 INFO 16528 --- [           main] o.s.o.j.p.SpringPersistenceUnitInfo    : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-09T18:01:46.134-06:00 INFO 16528 --- [           main] com.zaxxer.hikari.HikariDataSource   : HikariPool-1 - Starting...
2025-11-09T18:01:46.333-06:00 INFO 16528 --- [           main] com.zaxxer.hikari.pool.HikariPool    : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-09T18:01:46.355-06:00 INFO 16528 --- [           main] com.zaxxer.hikari.HikariDataSource   : HikariPool-1 - Start completed.
2025-11-09T18:01:46.358-06:00 WARN 16528 --- [           main] org.hibernate.orm.deprecation        : HHH90000025: H2ialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-09T18:01:47.116-06:00 INFO 16528 --- [           main] o.h.e.t.j.p.i.JtaPlatformInitiator   : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-09T18:01:47.147-06:00 INFO 16528 --- [           main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
```

The screenshot shows the Spring Boot DevTools interface. The top navigation bar includes tabs for 'Project' (selected), 'Terminal', 'Command Prompt', and others. The main area displays a terminal window with the following log output:

```
orm' to enable JTA platform integration)
2025-11-07T22:18:19.756-06:00 INFO 3040 --- [           main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-07T22:18:19.933-06:00 WARN 3040 --- [           main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-07T22:18:20.454-06:00 INFO 3040 --- [           main] o.s.b.t.w.SpringBootTestMockServletContext : Initializing Spring TestDispatcherServlet ''
2025-11-07T22:18:20.465-06:00 INFO 3040 --- [           main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''
2025-11-07T22:18:20.486-06:00 INFO 3040 --- [           main] o.s.b.a.e.web.EndpointLinksResolver   : Exposing 1 endpoint beneath base path '/actuator'
2025-11-07T22:18:20.534-06:00 INFO 3040 --- [           main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 66 ms
2025-11-07T22:18:20.698-06:00 INFO 3040 --- [           main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:18:20.767-06:00 WARN 3040 --- [           main] Configuration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
2025-11-07T22:18:20.791-06:00 INFO 3040 --- [           main] o.s.c.n.eureka.InstanceInfoFactory      : Setting initial instance status as: STARTING
2025-11-07T22:18:20.792-06:00 INFO 3040 --- [           main] com.netflix.discovery.DiscoveryClient  : Initializing Eureka in region us-east-1
2025-11-07T22:18:20.792-06:00 INFO 3040 --- [           main] com.netflix.discovery.DiscoveryClient  : Client configured to neither register nor query for data.
2025-11-07T22:18:20.792-06:00 INFO 3040 --- [           main] com.netflix.discovery.DiscoveryClient  : Discovery Client initialized at timestamp 1762575500792 with initial instances count: 0
2025-11-07T22:18:20.800-06:00 INFO 3040 --- [           main] o.s.c.n.e.s.EurekaServiceRegistry       : Registering application UNKNOWN with eureka with status UP
2025-11-07T22:18:20.807-06:00 INFO 3040 --- [           main] c.m.s.P.StudentControllerIntegracionTest : Started StudentControllerIntegracionTest in 1.893 seconds (process running for 13.186)
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 2.596 s -- in com.microservice.student.PruebasIntegracion.StudentControllerIntegracionTest
[INFO] Running com.microservice.student.PruebasIntegracion.StudentControllerIntegracionTest
2025-11-07T22:18:21.475-06:00 INFO 3040 --- [           main] t.c.s.AnnotationConfigContextLoaderUtils : Could not detect default configuration classes for test class [com.microservice.student.PruebasIntegracion.StudentControllerIntegracionTest]: StudentControllerIntegracionTest does not declare any static, non-private, non-final, nested classes annotated with @Configuration.
2025-11-07T22:18:21.479-06:00 INFO 3040 --- [           main] .b.t.c.SpringBootTestContextBootstrapper : Found @SpringBootConfiguration com.microservice.student.MicroserviceStudentApplication for test class com.microservice.student.PruebasIntegracion.StudentControllerIntegracionTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.106 s -- in com.microservice.student.PruebasIntegracion.StudentControllerIntegracionTest
[INFO] Running com.microservice.student.PruebasUnitarias.StudentControllerTest
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.648 s -- in com.microservice.student.PruebasUnitarias.StudentControllerTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 25, Failures: 0, Errors: 0, Skipped: 0
[INFO]
```

Pruebas de usabilidad student



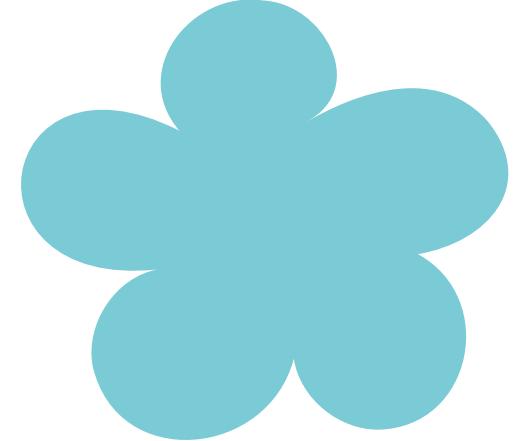
Para comprobar que las pruebas de usabilidad del microservicio Student se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Al completarse exitosamente, los resultados se muestran en verde, confirmando que la interfaz y la experiencia del usuario funcionan como se espera.

The screenshot shows the IntelliJ IDEA interface with the following details:

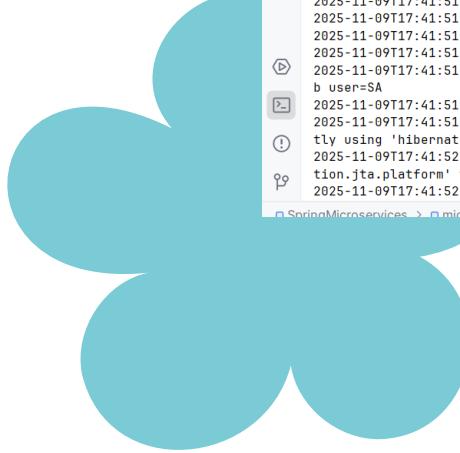
- Project:** SpringMicroservices
- Version control:** Version control
- File:** StudentControllerIntegrationTest.java (selected)
- Code:** Shows a private ObjectMapper field declaration.
- Terminal:** Displays the command-line output of the test run, including logs from Eureka, Netflix Discovery Client, and the test itself.
- Bottom Status Bar:** Shows the current file path as C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student> and the terminal encoding as UTF-8.

```
2025-11-07T22:04:14.023-06:00 INFO 3272 --- [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-07T22:04:14.140-06:00 WARN 3272 --- [main] iguren$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.
2025-11-07T22:04:14.297-06:00 INFO 3272 --- [main] o.s.c.n.eureka.InstanceInfoFactory : Setting initial instance status as: STARTING
2025-11-07T22:04:14.426-06:00 INFO 3272 --- [main] com.netflix.discovery.DiscoveryClient : Initializing Eureka in region us-east-1
2025-11-07T22:04:14.438-06:00 INFO 3272 --- [main] com.netflix.discovery.DiscoveryClient : Client configured to neither register nor query for data.
2025-11-07T22:04:14.444-06:00 INFO 3272 --- [main] com.netflix.discovery.DiscoveryClient : Discovery Client initialized at timestamp 1762574654442 with initial instances count: 0
2025-11-07T22:04:14.473-06:00 INFO 3272 --- [main] o.s.c.n.e.s.EurekaServiceRegistry : Registering application UNKNOWN with eureka with status UP
2025-11-07T22:04:14.494-06:00 INFO 3272 --- [main] c.m.s.P.StudentControllerIntegrationTest : Started StudentControllerIntegrationTest in 9.736 seconds (process running for 11.58)
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.14.19\byte-buddy-agent-1.14.19.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disallowed by default in a future release
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 11.93 s -- in com.microservice.student.PruebasIntegracion.StudentControllerIntegrationTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 8, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 16.508 s
[INFO] Finished at: 2025-11-07T22:04:16-06:00
[INFO] -----
C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student>
C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-student>
```

Pruebas de rendimiento course



Para comprobar que las pruebas de rendimiento del microservicio Course se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Al completarse con éxito, los resultados se muestran en verde, indicando que el servicio responde dentro de los tiempos esperados.



```
SpringMicroservices Version control
Project CourseSistemaTest.java CourseControllerUsabilidadTest.java CourseRendimientoTest.java
Terminal Command Prompt + m
2025-11-09T17:41:46.274-06:00 INFO 9204 --- [msvc-course] [main] c.m.c.P.CourseRendimientoTest : Starting CourseRendimientoTest using Java 21.0.1 with PID 9204 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course)
2025-11-09T17:41:46.284-06:00 INFO 9204 --- [msvc-course] [main] c.m.c.P.CourseRendimientoTest : No active profile set, falling back to 1 default profile: "default"
2025-11-09T17:41:48.985-06:00 INFO 9204 --- [msvc-course] [main] s.d.r.c.RepositoryConfigurationDelegate : Bootstrapping Spring Data JPA repositories in DEFAULT mode.
2025-11-09T17:41:49.142-06:00 INFO 9204 --- [msvc-course] [main] s.d.r.c.RepositoryConfigurationDelegate : Finished Spring Data repository scanning in 151 ms. Found 1 JPA repository interface.
2025-11-09T17:41:49.468-06:00 INFO 9204 --- [msvc-course] [main] o.s.cloud.context.scope.GenericScope : BeanFactory id=9521eab3-6462-3b67-98cf-6694cc4386d4
Java HotSpot(TM) 64-Bit Server VM warning: Sharing is only supported for boot loader classes because bootstrap classpath has been appended
WARNING: A Java agent has been loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.14.18\byte-buddy-agent-1.14.18.jar)
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
WARNING: Dynamic loading of agents will be disabled by default in a future release
2025-11-09T17:41:50.829-06:00 WARN 9204 --- [msvc-course] [main] trationDelegate$BeanPostProcessorChecker : Bean 'org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig' of type [org.springframework.cloud.client.loadbalancer.LoadBalancerAutoConfiguration$DeferringLoadBalancerInterceptorConfig] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). The currently created BeanPostProcessor [lbRestClientPostProcessor] is declared through a non-static factory method on that class; consider declaring it as static instead.
2025-11-09T17:41:50.829-06:00 WARN 9204 --- [msvc-course] [main] trationDelegate$BeanPostProcessorChecker : Bean 'deferringLoadBalancerInterceptor' of type [org.springframework.cloud.client.loadbalancer.DeferringLoadBalancerInterceptor] is not eligible for getting processed by all BeanPostProcessors (for example: not eligible for auto-proxying). Is this bean getting eagerly injected into a currently created BeanPostProcessor [lbRestClientPostProcessor]? Check the corresponding BeanPostProcessor declaration and its dependencies.
2025-11-09T17:41:51.128-06:00 INFO 9204 --- [msvc-course] [main] o.hibernate.jpa.internal.util.LogHelper : HHH000204: Processing PersistenceUnitInfo [name: default]
2025-11-09T17:41:51.276-06:00 INFO 9204 --- [msvc-course] [main] org.hibernate.Version : HHH000412: Hibernate ORM core version 6.5.2.Final
2025-11-09T17:41:51.346-06:00 INFO 9204 --- [msvc-course] [main] o.h.c.internal.RegionFactoryInitiator : HHH000826: Second-level cache disabled
2025-11-09T17:41:51.574-06:00 INFO 9204 --- [msvc-course] [main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer
2025-11-09T17:41:51.619-06:00 INFO 9204 --- [msvc-course] [main] com.zaxxer.hikaricp.HikariDataSource : HikariPool-1 - Starting...
2025-11-09T17:41:51.876-06:00 INFO 9204 --- [msvc-course] [main] com.zaxxer.hikaricp.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb user=SA
2025-11-09T17:41:51.876-06:00 INFO 9204 --- [msvc-course] [main] com.zaxxer.hikaricp.HikariDataSource : HikariPool-1 - Start completed.
2025-11-09T17:41:51.927-06:00 WARN 9204 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-09T17:41:52.928-06:00 INFO 9204 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-09T17:41:52.985-06:00 INFO 9204 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-09T17:41:53.235-06:00 WARN 9204 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-09T17:41:54.191-06:00 WARN 9204 --- [msvc-course] [main] s.s.UserDetailsServiceAutoConfiguration : Using generated security password: f84f2de4-e6f5-4d86-8fce-f62ec3600d4b
This generated password is for development use only. Your security configuration must be updated before running your application in production.
2025-11-09T17:41:54.215-06:00 INFO 9204 --- [msvc-course] [main] r$InitializeUserDetailsManager : Global AuthenticationManager configured with UserDetailsService bean with name inMemoryUserDetailsManager
2025-11-09T17:41:54.453-06:00 INFO 9204 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-09T17:41:54.519-06:00 WARN 9204 --- [msvc-course] [main] iuguration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-09T17:41:54.569-06:00 INFO 9204 --- [msvc-course] [main] c.m.c.P.CourseRendimientoTest : Started CourseRendimientoTest in 8.695 seconds (process running for 9.765)
? Tiempo de respuesta: 2 ms
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 9.379 s -- in com.microservice.course.PruebasRendimientoUsabilidad.CourseRendimientoTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 13.779 s
[INFO] Finished at: 2025-11-09T17:41:54-06:00
[INFO] -----
```



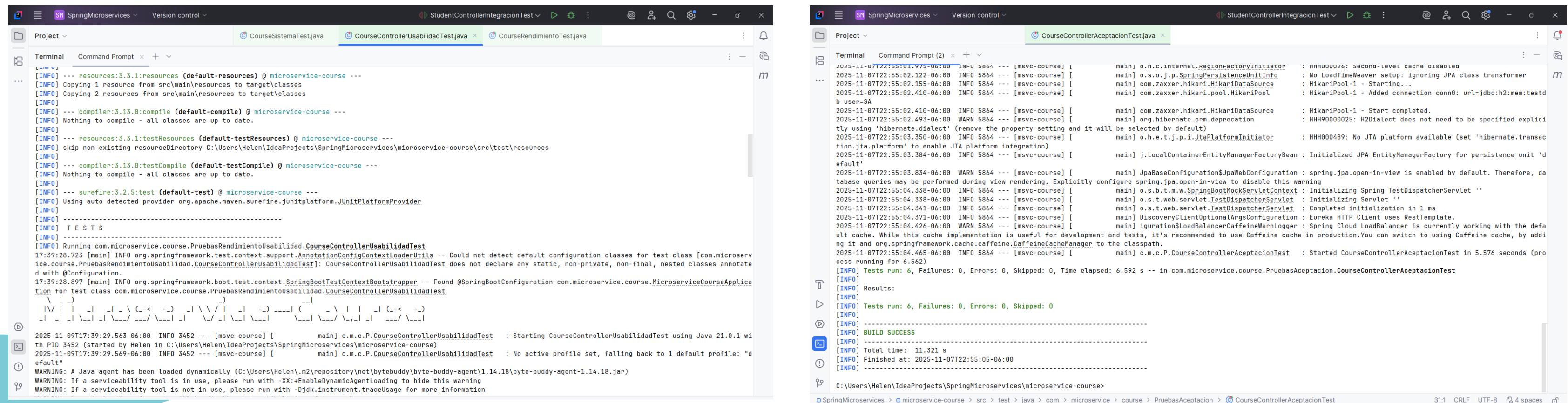
```
SpringMicroservices Version control
Project CourseSistemaTest.java CourseControllerUsabilidadTest.java CourseRendimientoTest.java
Terminal Command Prompt + m
2025-11-09T17:41:51.927-06:00 WARN 9204 --- [msvc-course] [main] org.hibernate.orm.deprecation : HHH0000025: H2Dialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)
2025-11-09T17:41:52.928-06:00 INFO 9204 --- [msvc-course] [main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)
2025-11-09T17:41:52.985-06:00 INFO 9204 --- [msvc-course] [main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'
2025-11-09T17:41:53.235-06:00 WARN 9204 --- [msvc-course] [main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning
2025-11-09T17:41:54.191-06:00 WARN 9204 --- [msvc-course] [main] s.s.UserDetailsServiceAutoConfiguration : Using generated security password: f84f2de4-e6f5-4d86-8fce-f62ec3600d4b
This generated password is for development use only. Your security configuration must be updated before running your application in production.
2025-11-09T17:41:54.215-06:00 INFO 9204 --- [msvc-course] [main] r$InitializeUserDetailsManager : Global AuthenticationManager configured with UserDetailsService bean with name inMemoryUserDetailsManager
2025-11-09T17:41:54.453-06:00 INFO 9204 --- [msvc-course] [main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.
2025-11-09T17:41:54.519-06:00 WARN 9204 --- [msvc-course] [main] iuguration$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.CaffeineCacheManager to the classpath.
2025-11-09T17:41:54.569-06:00 INFO 9204 --- [msvc-course] [main] c.m.c.P.CourseRendimientoTest : Started CourseRendimientoTest in 8.695 seconds (process running for 9.765)
? Tiempo de respuesta: 2 ms
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 9.379 s -- in com.microservice.course.PruebasRendimientoUsabilidad.CourseRendimientoTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 13.779 s
[INFO] Finished at: 2025-11-09T17:41:54-06:00
[INFO] -----
```

C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course>

36:2 CRLF UTF-8 4 spaces

Pruebas de usabilidad course

Para comprobar que las pruebas de usabilidad del microservicio Course se ejecutan correctamente, se utilizan comandos que permiten correr los tests. Al completarse exitosamente, los resultados se muestran en verde, confirmando que la interfaz y la experiencia del usuario funcionan correctamente.



The image shows two side-by-side terminal windows from an IDE, both titled "StudentControllerIntegracionTest". The left window has tabs for "CourseSistemaTest.java", "CourseControllerUsabilidadTest.java" (which is currently selected), and "CourseRendimientoTest.java". The right window has tabs for "CourseControllerAceptacionTest.java" and "CourseControllerUsabilidadTest.java" (which is currently selected). Both terminals show command-line output from Java tests.

Left Terminal Output (CourseControllerUsabilidadTest.java):

```
[INFO] --- resources:3.3.1:resources (@ microservice-course ---  
[INFO] Copying 1 resource from src\main\resources to target\classes  
[INFO] Copying 2 resources from src\main\resources to target\classes  
[INFO]  
[INFO] --- compiler:3.13.0:compile (@ microservice-course ---  
[INFO] Nothing to compile - all classes are up to date.  
[INFO]  
[INFO] --- resources:3.3.1:testResources (@ microservice-course ---  
[INFO] skip non existing resourceDirectory C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course\src\test\resources  
[INFO]  
[INFO] --- compiler:3.13.0:testCompile (@ microservice-course ---  
[INFO] Nothing to compile - all classes are up to date.  
[INFO]  
[INFO] --- surefire:3.2.5:test (@ microservice-course ---  
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformProvider  
[INFO] -----  
[INFO] T E S T S  
[INFO] -----  
[INFO] Running com.microservice.course.PruebasRendimientoUsabilidad.CourseControllerUsabilidadTest  
17:39:28.728 [main] INFO org.springframework.test.context.support.AnnotationConfigContextLoaderUtils -- Could not detect default configuration classes for test class [com.microservice.course.PruebasRendimientoUsabilidad.CourseControllerUsabilidadTest]: CourseControllerUsabilidadTest does not declare any static, non-private, non-final, nested classes annotated with @Configuration.  
17:39:28.897 [main] INFO org.springframework.boot.test.context.SpringBootTestBootstrapper -- Found @SpringBootConfiguration com.microservice.course.MicroserviceCourseApplication for test class com.microservice.course.PruebasRendimientoUsabilidad.CourseControllerUsabilidadTest  
    \ | -)  
     )| | | -| -| \ ( -< -_) _| \ \ / | _| -| )---| ( _ - \ | | -| ( -< -_ )  
    -| -| -| -| -| \ \ / ---| / \ \ -| -| \ \ / ---| / \ \ -| -| ---| / \ \ -|  
2025-11-09T17:39:29.563-06:00 INFO 3452 --- [msvc-course] [ main] c.m.c.P.CourseControllerUsabilidadTest : Starting CourseControllerUsabilidadTest using Java 21.0.1 with PID 3452 (started by Helen in C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course)  
2025-11-09T17:39:29.569-06:00 INFO 3452 --- [msvc-course] [ main] c.m.c.P.CourseControllerUsabilidadTest : No active profile set, falling back to 1 default profile: "default"  
WARNING: A Java agent was loaded dynamically (C:\Users\Helen\.m2\repository\net\bytebuddy\byte-buddy-agent\1.14.18\byte-buddy-agent-1.14.18.jar)  
WARNING: If a serviceability tool is in use, please run with -XX:+EnableDynamicAgentLoading to hide this warning  
WARNING: If a serviceability tool is not in use, please run with -Djdk.instrument.traceUsage for more information
```

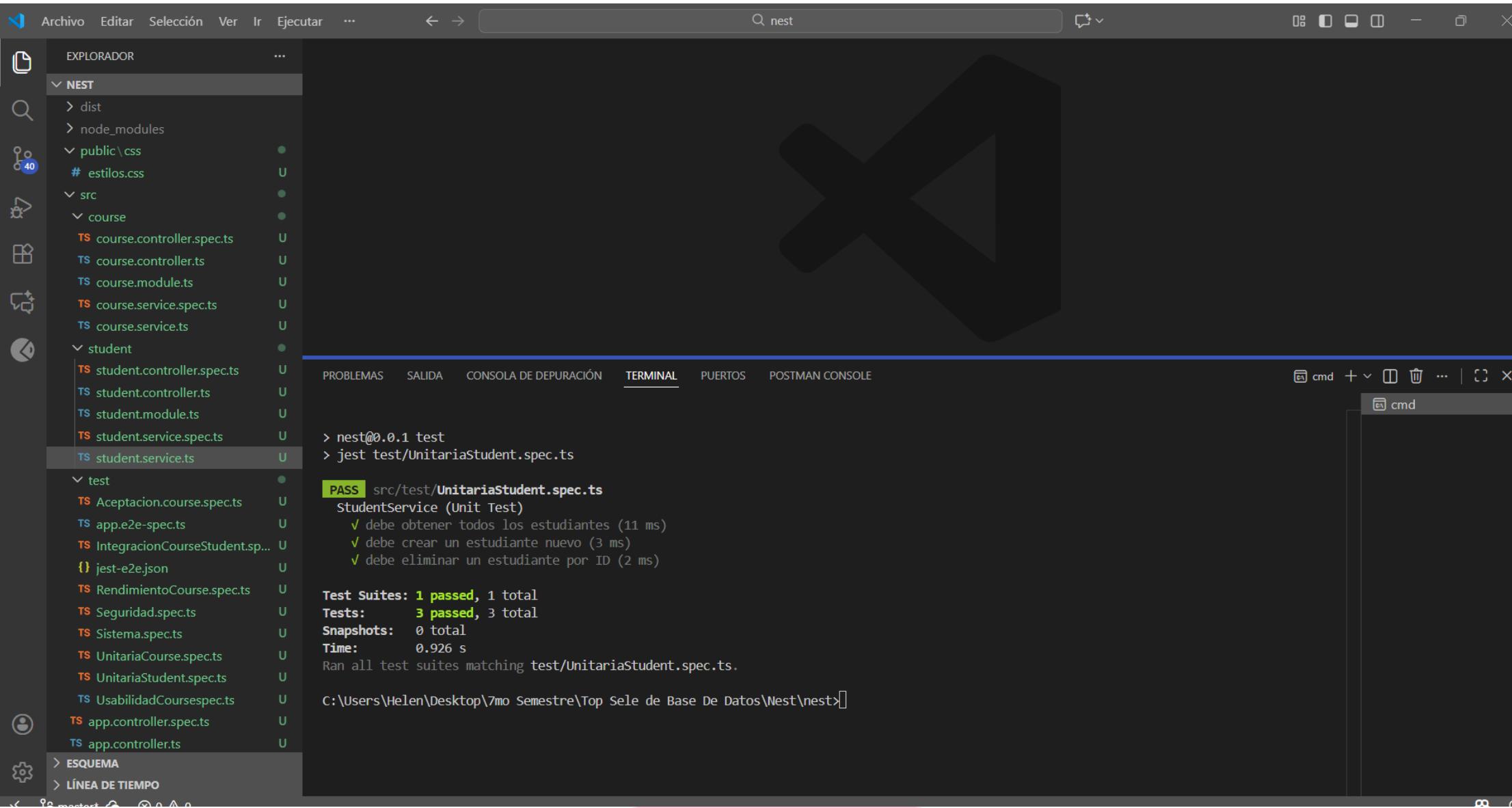
Right Terminal Output (CourseControllerAceptacionTest.java):

```
2025-11-07T22:55:01.975-06:00 INFO 5864 --- [msvc-course] [ main] o.n.c.internal.RegionFactoryInitiator : mmuuuuuu: Second-level cache disabled  
2025-11-07T22:55:02.122-06:00 INFO 5864 --- [msvc-course] [ main] o.s.o.j.p.SpringPersistenceUnitInfo : No LoadTimeWeaver setup: ignoring JPA class transformer  
2025-11-07T22:55:02.155-06:00 INFO 5864 --- [msvc-course] [ main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Starting...  
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [ main] com.zaxxer.hikari.pool.HikariPool : HikariPool-1 - Added connection conn0: url=jdbc:h2:mem:testdb users=SA  
2025-11-07T22:55:02.410-06:00 INFO 5864 --- [msvc-course] [ main] com.zaxxer.hikari.HikariDataSource : HikariPool-1 - Start completed.  
2025-11-07T22:55:02.493-06:00 WARN 5864 --- [msvc-course] [ main] org.hibernate.orm.deprecation : HHH90000025: H2ialect does not need to be specified explicitly using 'hibernate.dialect' (remove the property setting and it will be selected by default)  
2025-11-07T22:55:03.350-06:00 INFO 5864 --- [msvc-course] [ main] o.h.e.t.j.p.i.JtaPlatformInitiator : HHH000489: No JTA platform available (set 'hibernate.transaction.jta.platform' to enable JTA platform integration)  
2025-11-07T22:55:03.384-06:00 INFO 5864 --- [msvc-course] [ main] j.LocalContainerEntityManagerFactoryBean : Initialized JPA EntityManagerFactory for persistence unit 'default'  
2025-11-07T22:55:03.834-06:00 WARN 5864 --- [msvc-course] [ main] JpaBaseConfiguration$JpaWebConfiguration : spring.jpa.open-in-view is enabled by default. Therefore, database queries may be performed during view rendering. Explicitly configure spring.jpa.open-in-view to disable this warning  
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [ main] o.s.b.t.m.w.SpringBootMockServletContext : Initializing Spring TestDispatcherServlet ''  
2025-11-07T22:55:04.338-06:00 INFO 5864 --- [msvc-course] [ main] o.s.t.web.servlet.TestDispatcherServlet : Initializing Servlet ''  
2025-11-07T22:55:04.341-06:00 INFO 5864 --- [msvc-course] [ main] o.s.t.web.servlet.TestDispatcherServlet : Completed initialization in 1 ms  
2025-11-07T22:55:04.371-06:00 INFO 5864 --- [msvc-course] [ main] DiscoveryClientOptionalArgsConfiguration : Eureka HTTP Client uses RestTemplate.  
2025-11-07T22:55:04.426-06:00 WARN 5864 --- [msvc-course] [ main] Ignigation$LoadBalancerCaffeineWarnLogger : Spring Cloud LoadBalancer is currently working with the default cache. While this cache implementation is useful for development and tests, it's recommended to use Caffeine cache in production. You can switch to using Caffeine cache, by adding it and org.springframework.cache.caffeine.CaffeineCacheManager to the classpath.  
2025-11-07T22:55:04.465-06:00 INFO 5864 --- [msvc-course] [ main] c.m.c.P.CourseControllerAceptacionTest : Started CourseControllerAceptacionTest in 5.576 seconds (process running for 6.562)  
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 6.592 s -- in com.microservice.course.PruebasAceptacion.CourseControllerAceptacionTest  
[INFO]  
[INFO] Results:  
[INFO]  
[INFO] Tests run: 6, Failures: 0, Errors: 0, Skipped: 0  
[INFO]  
[INFO] -----  
[INFO] BUILD SUCCESS  
[INFO] -----  
[INFO] Total time: 11.321 s  
[INFO] Finished at: 2025-11-07T22:55:05-06:00  
[INFO] -----  
C:\Users\Helen\IdeaProjects\SpringMicroservices\microservice-course>
```

31:1 CRLF UTF-8 ⌂ 4 spaces ⌂

Prueba unitaria nest student

En la siguiente imagen se puede observar que se está utilizando el framework NestJS, y que en el módulo Student se ha realizado la prueba unitaria. El resultado se muestra en verde, lo que confirma que la prueba se ha ejecutado correctamente.



The screenshot shows a dark-themed instance of Visual Studio Code (VS Code) with the title bar "nest". The left sidebar is the "EXPLORADOR" (Explorer) view, which lists the project structure under the "NEST" folder. The "TERMINAL" tab is active, displaying the output of a Jest test run:

```
> nest@0.0.1 test
> jest test/UnitariaStudent.spec.ts

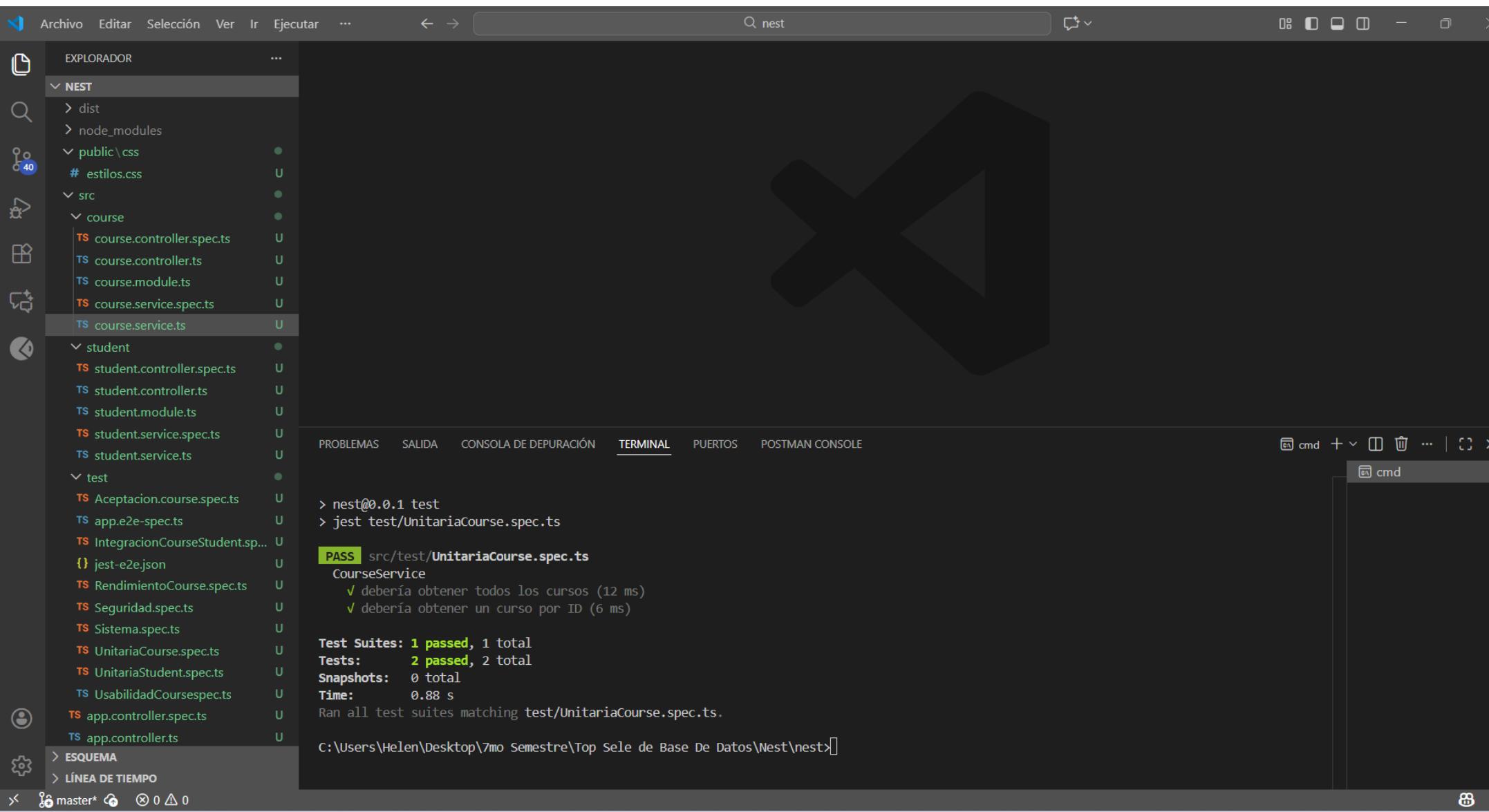
PASS src/test/UnitariaStudent.spec.ts
StudentService (Unit Test)
  ✓ debe obtener todos los estudiantes (11 ms)
  ✓ debe crear un estudiante nuevo (3 ms)
  ✓ debe eliminar un estudiante por ID (2 ms)

Test Suites: 1 passed, 1 total
Tests: 3 passed, 3 total
Snapshots: 0 total
Time: 0.926 s
Ran all test suites matching test/UnitariaStudent.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```

Prueba unitaria nest course

Como se puede apreciar en la siguiente imagen, se está trabajando con el framework NestJS, y en el módulo Course se ha ejecutado la prueba unitaria. Actualmente, el resultado se muestra en verde, lo que indica que la prueba se ha completado correctamente.



The screenshot shows a dark-themed instance of Visual Studio Code (VS Code) with the following details:

- File Explorer (Left):** Shows the project structure under the "NEST" folder:
 - dist
 - node_modules
 - public\css (contains estilos.css)
 - src
 - course
 - course.controller.spec.ts
 - course.controller.ts
 - course.module.ts
 - course.service.spec.ts
 - course.service.ts
 - student
 - student.controller.spec.ts
 - student.controller.ts
 - student.module.ts
 - student.service.spec.ts
 - student.service.ts
 - test
 - Aceptacion.course.spec.ts
 - app.e2e-spec.ts
 - IntegracionCourseStudent.sp...
 - jest-e2e.json
 - RendimientoCourse.spec.ts
 - Seguridad.spec.ts
 - Sistema.spec.ts
 - UnitariaCourse.spec.ts
 - UnitariaStudent.spec.ts
 - UsabilidadCoursespec.ts
 - app.controller.spec.ts
 - app.controller.ts
 - ESQUEMA
 - LÍNEA DE TIEMPO
- Terminal (Bottom):** Displays the output of a Jest test run:

```
> nest@0.0.1 test
> jest test/UnitariaCourse.spec.ts

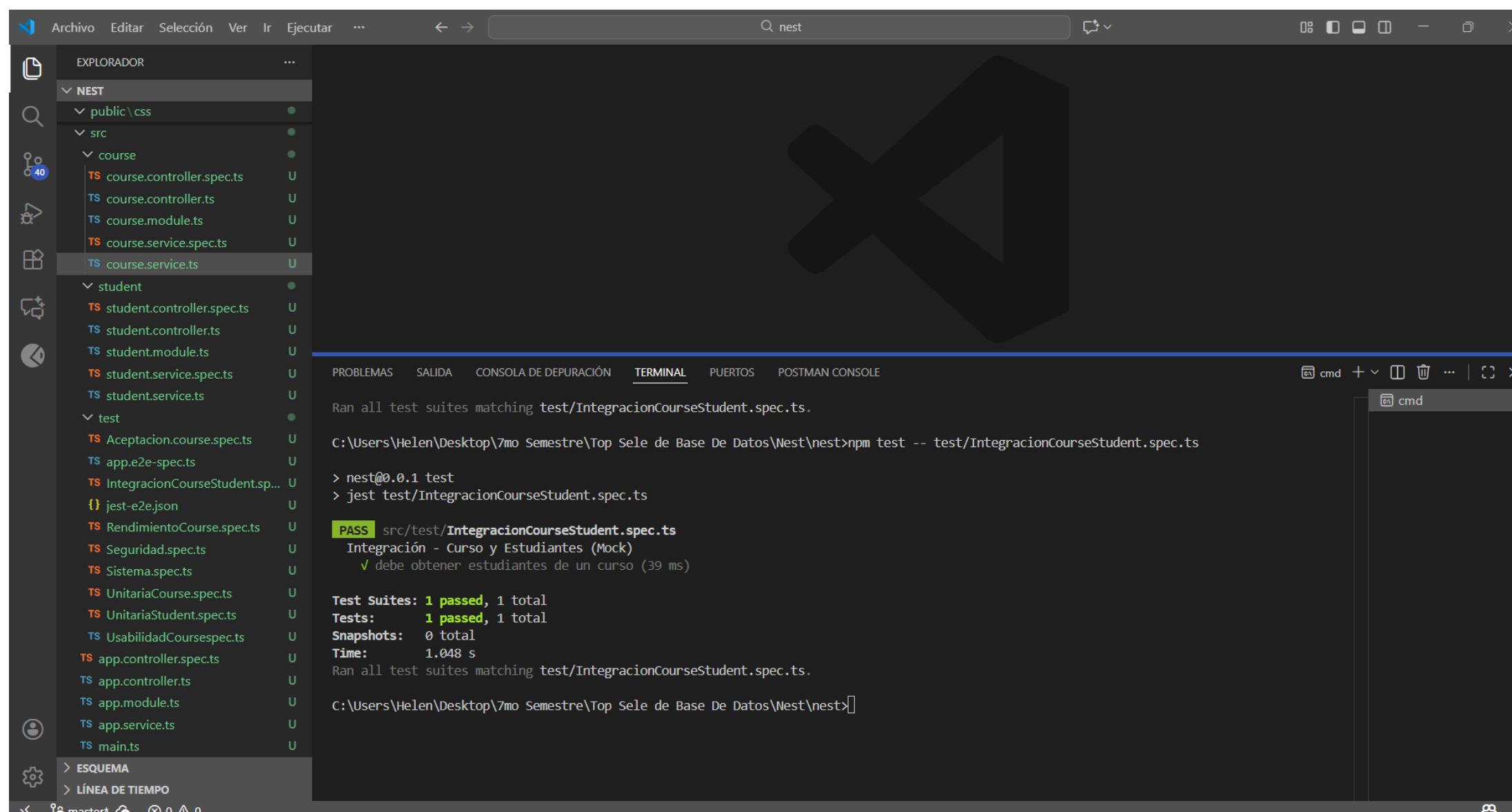
PASS src/test/UnitariaCourse.spec.ts
  CourseService
    ✓ debería obtener todos los cursos (12 ms)
    ✓ debería obtener un curso por ID (6 ms)

Test Suites: 1 passed, 1 total
Tests:       2 passed, 2 total
Snapshots:  0 total
Time:        0.88 s
Ran all test suites matching test/UnitariaCourse.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```

Prueba integración nest

La siguiente imagen, se está trabajando con el framework NestJS, y se ha ejecutado la prueba de integración de manera general para ambos módulos (Student y Course). Actualmente, el resultado aparece en verde, lo que indica que la prueba se ha completado correctamente.



The screenshot shows a dark-themed instance of Visual Studio Code (VS Code) with several panels open:

- Explorador (File Explorer):** Shows the project structure under the "NEST" folder, including files like "course.controller.spec.ts", "course.controller.ts", "course.module.ts", "course.service.spec.ts", "course.service.ts", "student.controller.spec.ts", "student.controller.ts", "student.module.ts", "student.service.spec.ts", "student.service.ts", and "IntegracionCourseStudent.spec.ts".
- Terminal:** Displays the output of a Jest test run. It shows the command "npm test -- test/IntegracionCourseStudent.spec.ts" being executed, followed by the test results:

```
Ran all test suites matching test/IntegracionCourseStudent.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>npm test -- test/IntegracionCourseStudent.spec.ts

> nest@0.0.1 test
> jest test/IntegracionCourseStudent.spec.ts

PASS  src/test/IntegracionCourseStudent.spec.ts
  Integración - Curso y Estudiantes (Mock)
    ✓ debe obtener estudiantes de un curso (39 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:   0 total
Time:        1.048 s
Ran all test suites matching test/IntegracionCourseStudent.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```
- Command Palette:** A small window titled "cmd" is visible in the bottom right corner.

Prueba aceptación nest

En la imagen mostrada se aprecia el uso del framework NestJS, donde se llevó a cabo la prueba de aceptación aplicada de manera conjunta a los módulos Student y Course. El resultado aparece en verde, lo cual confirma que la ejecución fue exitosa.

The screenshot shows a terminal window within a code editor interface (VS Code). The terminal is executing a Jest test command:

```
C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>npm test -- test/Aceptacion.course.spec.ts
```

The output shows the test results for the `Aceptacion.course.spec.ts` file:

```
> nest@0.0.1 test
> jest test/Aceptacion.course.spec.ts

PASS  src/test/Aceptacion.course.spec.ts
CourseController (Acceptance)
  ✓ debe devolver todos los cursos al usuario (11 ms)
  ✓ debe devolver un curso específico por su ID (3 ms)

Test Suites: 1 passed, 1 total
Tests:       2 passed, 2 total
Snapshots:  0 total
Time:        0.843 s, estimated 1 s
Ran all test suites matching test/Aceptacion.course.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```

Prueba seguridad nest

En la imagen se aprecia que se está utilizando el framework NestJS, donde se ejecutó la prueba de seguridad de forma conjunta para los módulos Student y Course. El resultado mostrado en verde indica que la validación se completó satisfactoriamente.

The screenshot shows a Visual Studio Code (VS Code) interface with a dark theme. On the left is the Explorer sidebar, which lists the project structure under the 'NEST' folder. The 'src' folder contains 'course' and 'student' modules, each with their respective controller, module, service, and spec files. The 'test' folder contains several E2E and unit test files. The central area is the terminal window, which displays the command 'nest@0.0.1 test' followed by the output of a Jest test run. The output shows a green 'PASS' status for the file 'src/test/Seguridad.spec.ts'. It details a test for 'Seguridad - Encabezados HTTP (E2E)' where a specific header check passed. The summary at the bottom indicates 1 test suite and 1 test passed, with a total time of 2.847 seconds. A command prompt window titled 'cmd' is also visible on the right side of the terminal.

```
> nest@0.0.1 test
> jest test/seguridad.spec.ts

PASS  src/test/Seguridad.spec.ts
  Seguridad - Encabezados HTTP (E2E)
    ✓ debe tener encabezados de seguridad (26 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:  0 total
Time:        2.847 s
Ran all test suites matching test/seguridad.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```

Prueba sistema nest

La imagen muestra el entorno de trabajo en NestJS, donde se ejecutó la prueba de sistema aplicada a ambos módulos, Student y Course. El indicador en verde confirma que la validación se realizó sin errores.

The screenshot shows a dark-themed IDE interface. On the left is the Explorer sidebar, which lists the project structure under the 'NEST' folder. It includes 'public\css', 'src' (containing 'course' and 'student' modules), and 'test' (containing various spec files like 'Aceptacion.course.spec.ts', 'app.e2e-spec.ts', etc.). The 'TERMINAL' tab is active, displaying the command 'jest test/Sistema.spec.ts' and its output:

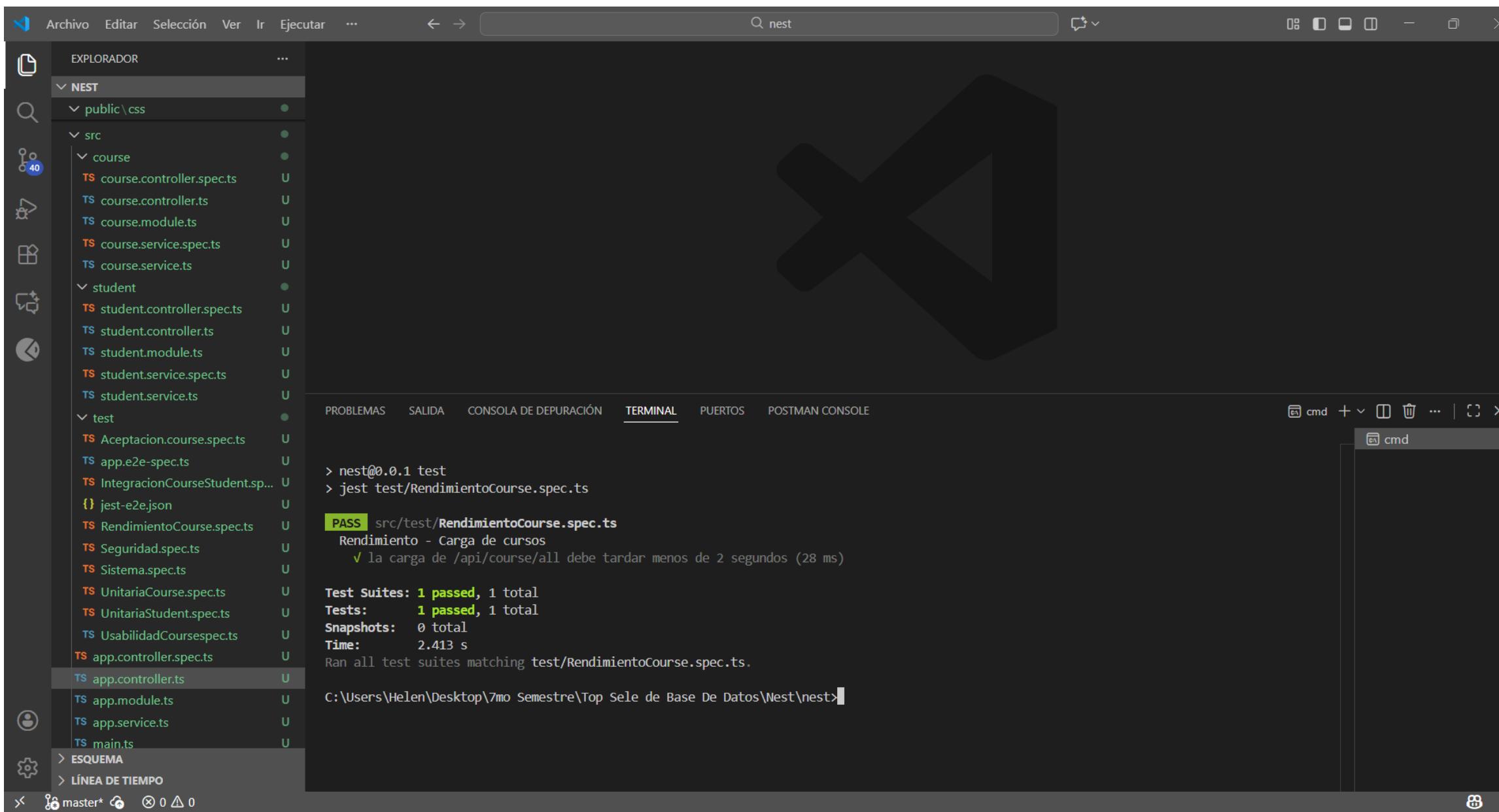
```
> jest test/Sistema.spec.ts
PASS src/test/Sistema.spec.ts
  Sistema - Aplicación Completa
    ✓ debe responder en la raíz con la vista principal (24 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:  0 total
Time:        2.512 s, estimated 3 s
Ran all test suites matching test/Sistema.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```

Prueba rendimiento nest

En la imagen se aprecia el entorno de trabajo con NestJS, donde se ejecutó la prueba de rendimiento aplicada a los módulos Student y Course. El resultado en verde confirma que la evaluación se completó satisfactoriamente.



The screenshot shows a dark-themed IDE interface. On the left, the Explorer sidebar displays the project structure under the 'NEST' folder, including 'public\css', 'src' (containing 'course', 'student', and 'test' subfolders), and 'ESQUEMA' and 'LÍNEA DE TIEMPO'. The 'TERMINAL' tab is active, showing the command line output:

```
> nest@0.0.1 test
> jest test/RendimientoCourse.spec.ts

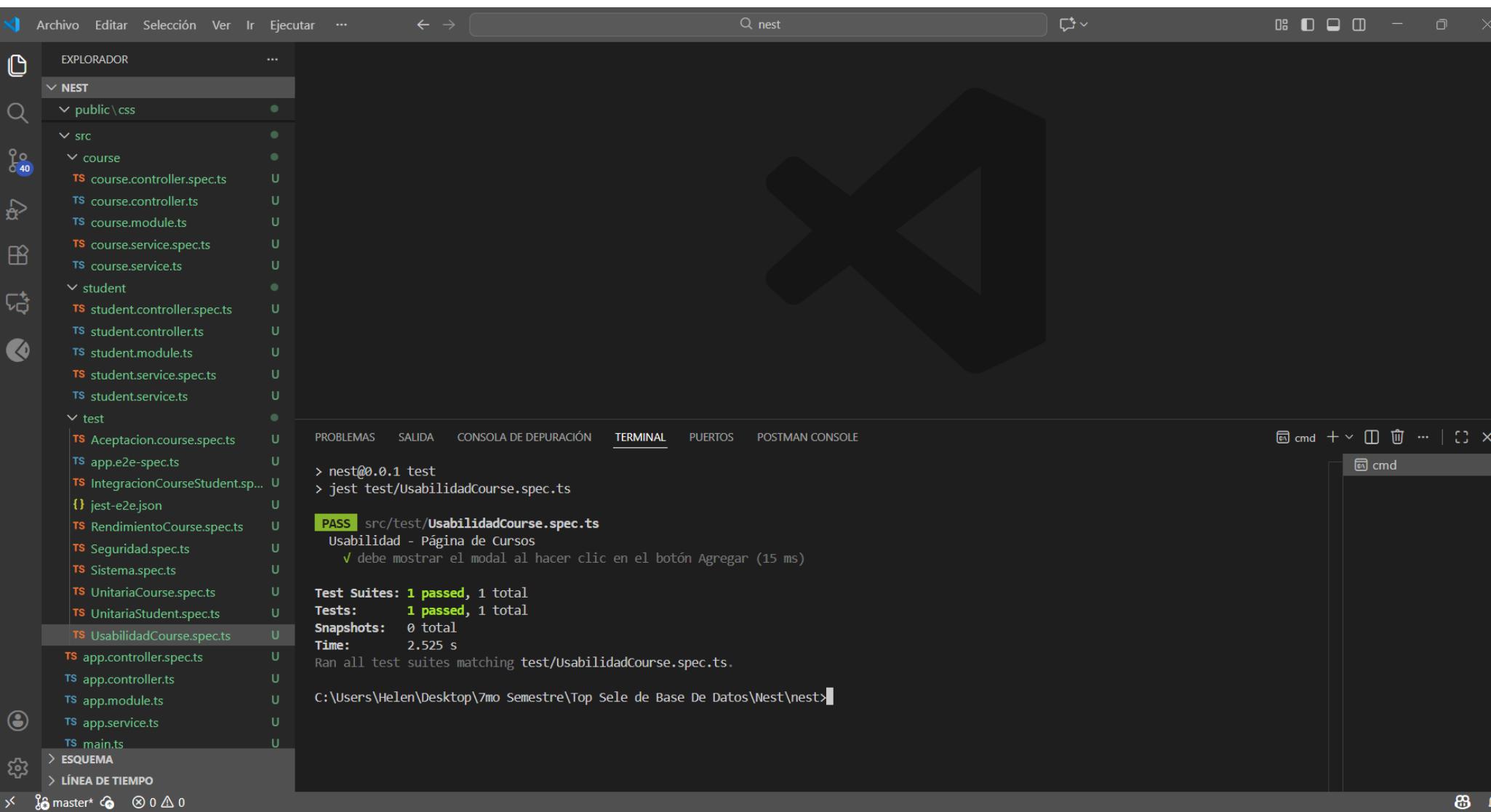
PASS  src/test/RendimientoCourse.spec.ts
Rendimiento - Carga de cursos
  ✓ la carga de /api/course/all debe tardar menos de 2 segundos (28 ms)

Test Suites: 1 passed, 1 total
Tests:    1 passed, 1 total
Snapshots: 0 total
Time:    2.413 s
Ran all test suites matching test/RendimientoCourse.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```

Prueba usabilidad nest

En la imagen se muestra el entorno desarrollado con NestJS, donde se ejecutó la prueba de usabilidad para los módulos Student y Course. El resultado aparece en verde, lo que indica que la evaluación se completó de forma exitosa.



The screenshot shows a VS Code interface with a dark theme. On the left is the Explorer sidebar, which lists files and folders under the 'NEST' project. In the center is the Terminal tab, which displays the command line output of a Jest test run. The output shows the test suite passed successfully.

```
> nest@0.0.1 test
> jest test/UsabilidadCourse.spec.ts

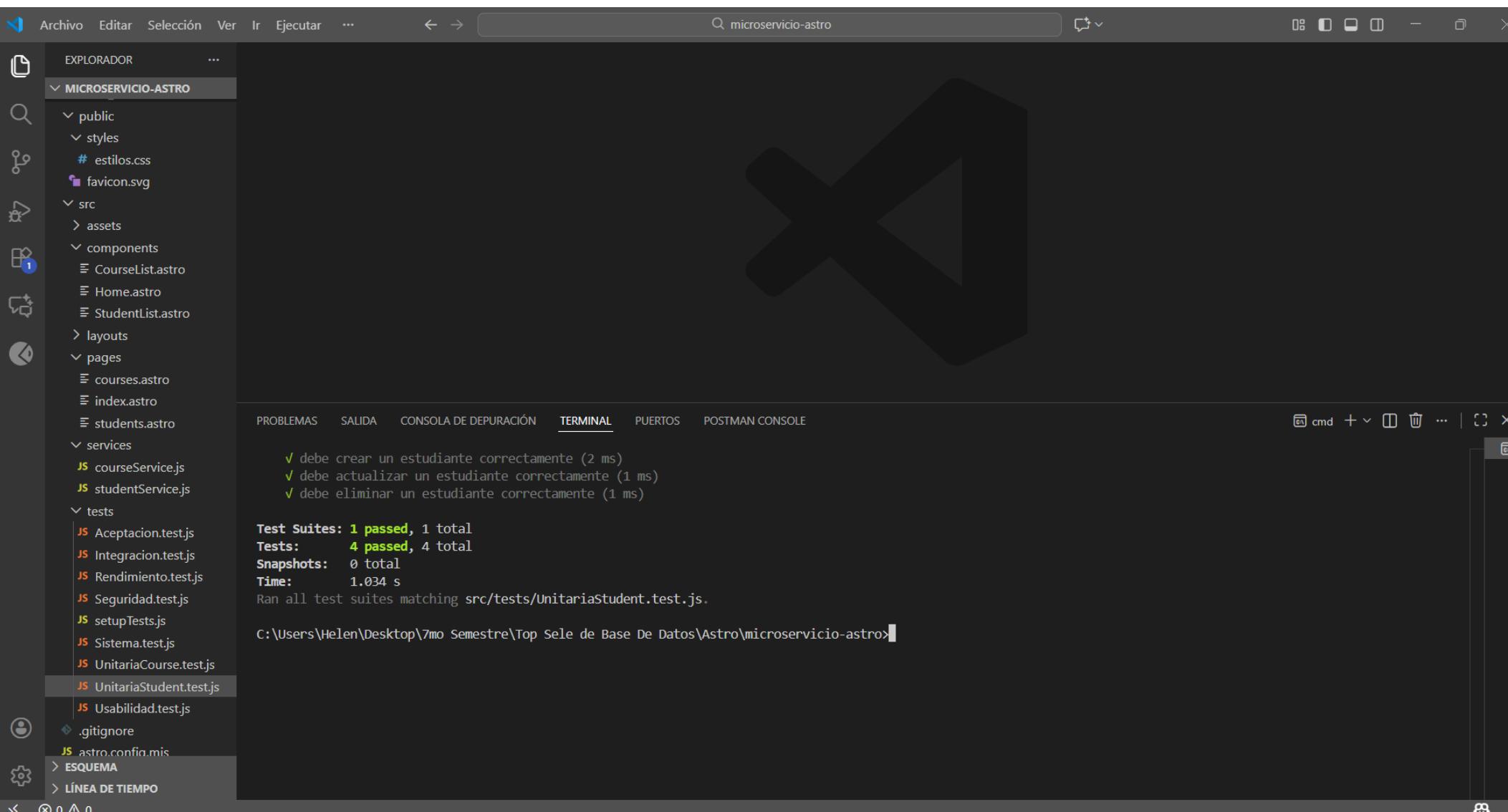
PASS  src/test/UsabilidadCourse.spec.ts
  Usabilidad - Página de Cursos
    ✓ debe mostrar el modal al hacer clic en el botón Agregar (15 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:  0 total
Time:        2.525 s
Ran all test suites matching test/UsabilidadCourse.spec.ts.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Nest\nest>
```

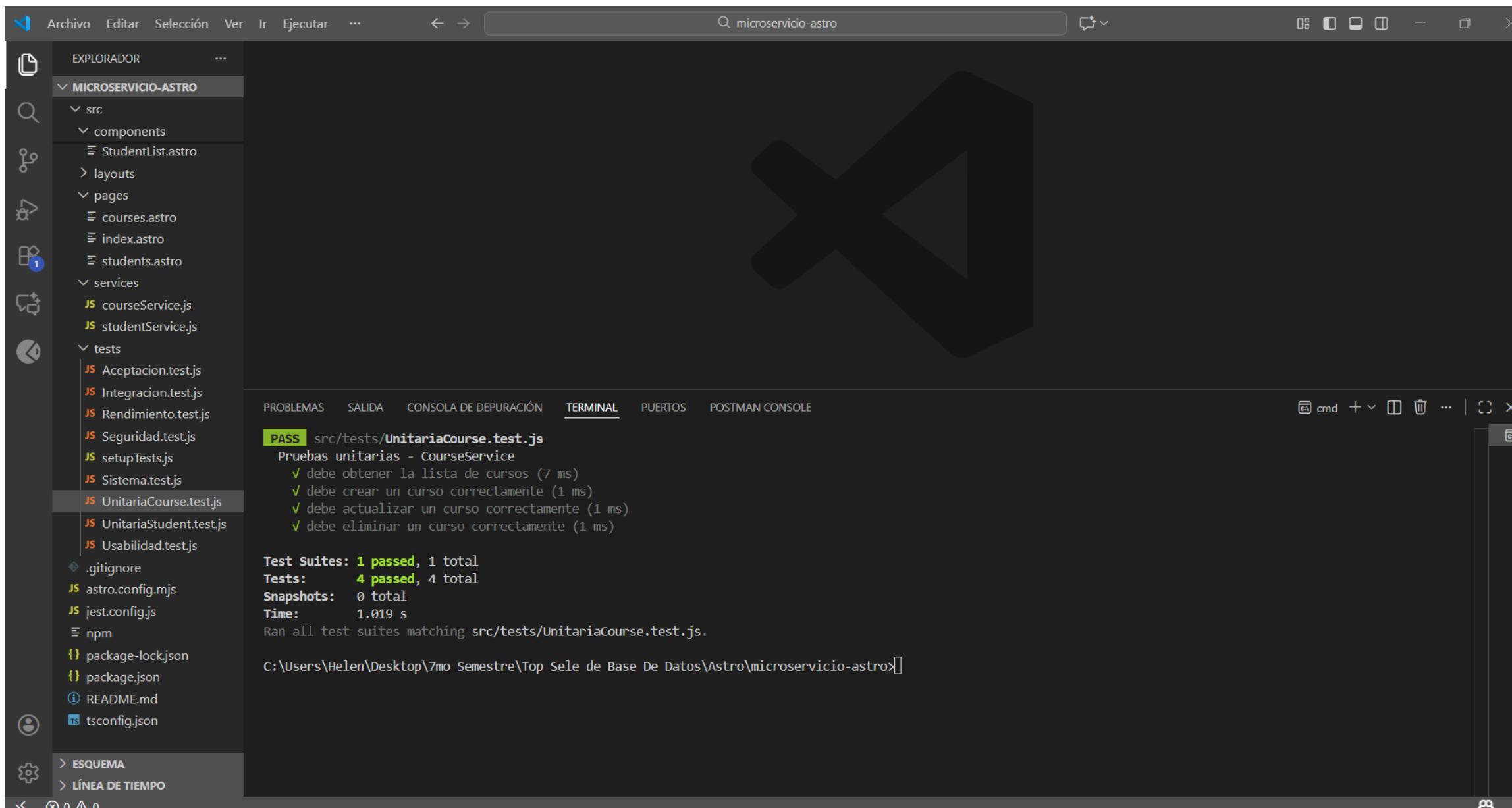
Prueba unitaria astro student

En la imagen se aprecia el entorno de trabajo basado en Astro, donde se ejecutó la prueba unitaria correspondiente al módulo Student. El resultado aparece en verde, lo que confirma que la ejecución fue satisfactoria.



Prueba unitaria astro course

En la imagen se muestra el entorno desarrollado con Astro, donde se llevó a cabo la prueba unitaria del módulo Course. El resultado aparece en verde, lo que indica que la validación se ejecutó de manera correcta.



The screenshot shows a dark-themed code editor interface with a terminal window open. The terminal window displays the output of a Jest unit test run for the file `src/tests/UnitariaCourse.test.js`. The test results are as follows:

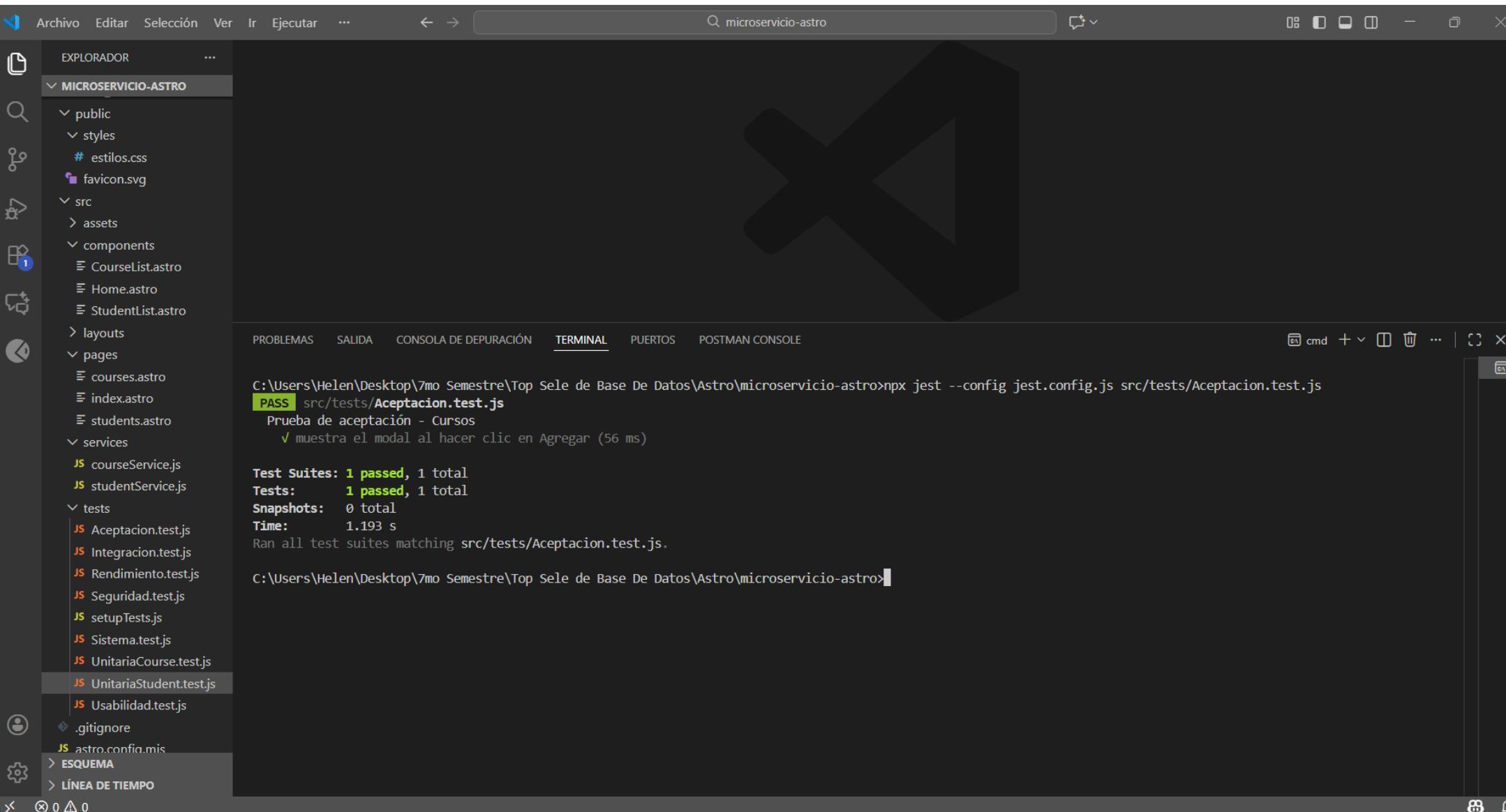
```
PASS  src/tests/UnitariaCourse.test.js
Pruebas unitarias - CourseService
  ✓ debe obtener la lista de cursos (7 ms)
  ✓ debe crear un curso correctamente (1 ms)
  ✓ debe actualizar un curso correctamente (1 ms)
  ✓ debe eliminar un curso correctamente (1 ms)

Test Suites: 1 passed, 1 total
Tests:    4 passed, 4 total
Snapshots: 0 total
Time:    1.019 s
Ran all test suites matching src/tests/UnitariaCourse.test.js.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>
```

Prueba de aceptación astro

En la imagen se aprecia el entorno configurado con Astro, donde se efectuó la prueba de aceptación aplicada de forma conjunta a los módulos Student y Course. El resultado mostrado en verde confirma que la ejecución fue satisfactoria.



The screenshot shows a terminal window titled "microservicio-astro" running on a Windows operating system. The left side of the window displays a file explorer sidebar with a tree view of the project structure under "MICROSERVICIO-ASTRO". The "tests" folder contains several Jest test files, with "Aceptacion.test.js" currently selected. The main pane of the terminal window shows the output of a Jest command: "npx jest --config jest.config.js src/tests/Aceptacion.test.js". The output indicates that the test suite passed with 1 test and 1 snapshot. The text also includes a summary of the test results and a note about a modal appearing after clicking "Agregar".

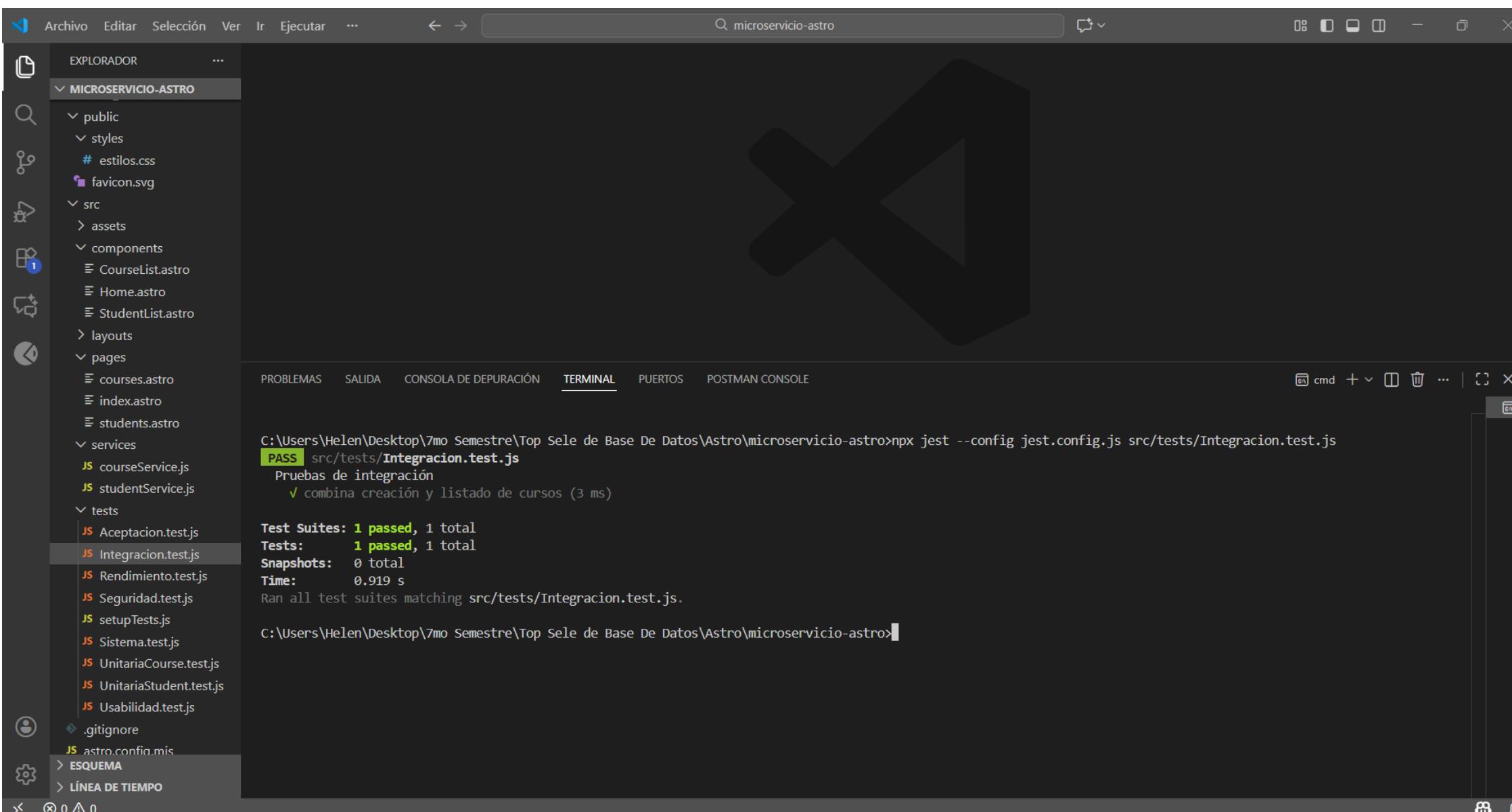
```
C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>npx jest --config jest.config.js src/tests/Aceptacion.test.js
PASS  src/tests/Aceptacion.test.js
  Prueba de aceptación - Cursos
    ✓ muestra el modal al hacer clic en Agregar (56 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:   0 total
Time:        1.193 s
Ran all test suites matching src/tests/Aceptacion.test.js.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>
```

Prueba integración astro

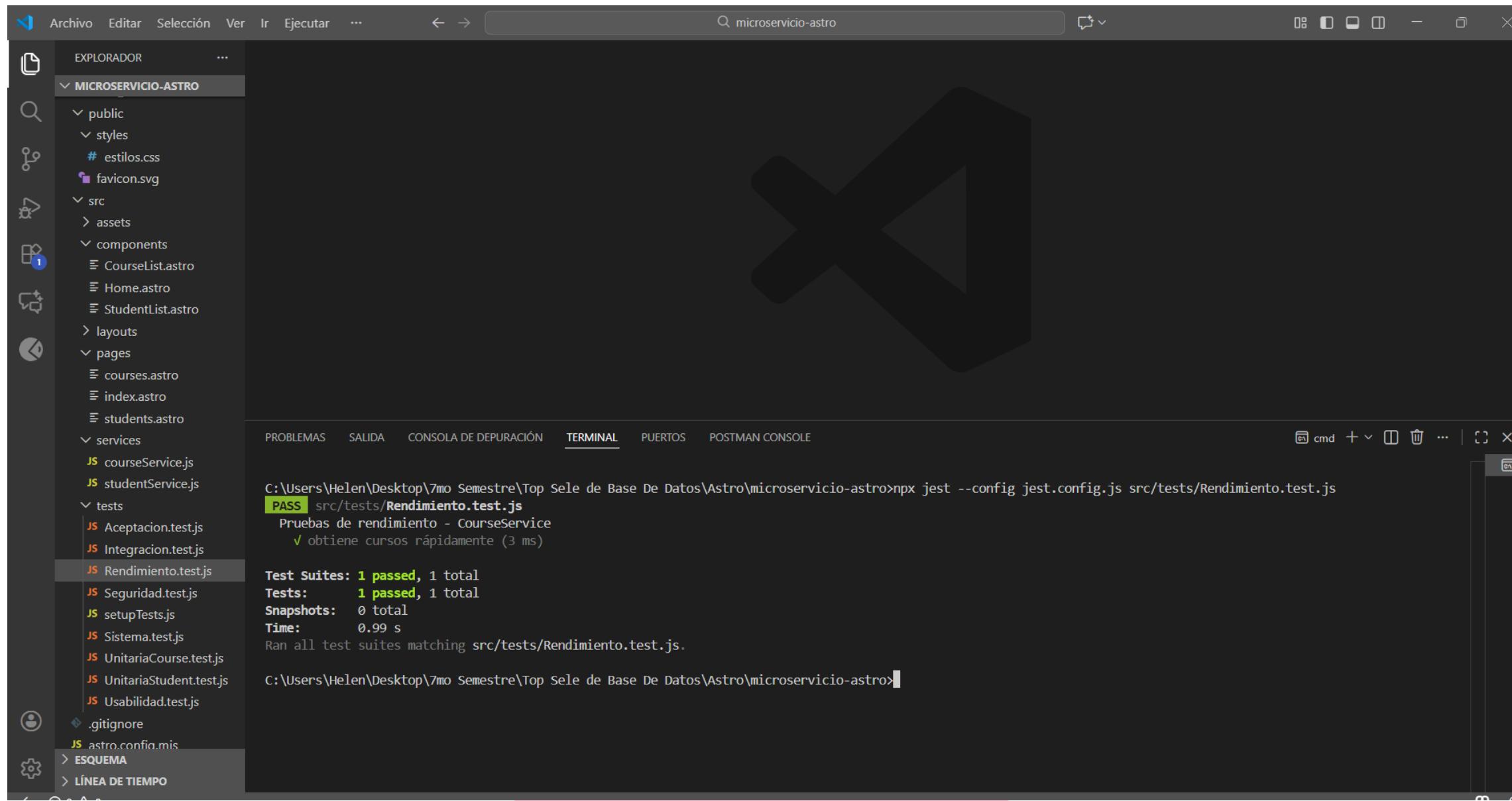
En la imagen se puede apreciar el entorno de trabajo con Astro, donde se ejecutó la prueba de integración de manera conjunta para los módulos Student y Course. El resultado en verde indica que la prueba se completó correctamente.



The screenshot shows a dark-themed code editor interface. On the left is the Explorer sidebar, which displays the project structure for 'MICROSERVICIO-ASTRO'. The 'tests' folder contains several Jest test files: 'Aceptacion.test.js', 'Integracion.test.js' (which is currently selected), 'Rendimiento.test.js', 'Seguridad.test.js', 'setupTests.js', 'Sistema.test.js', 'UnitariaCourse.test.js', 'UnitariaStudent.test.js', and 'Usabilidad.test.js'. The main workspace is a terminal window titled 'TERMINAL' at the bottom. It shows the command 'npx jest --config jest.config.js src/tests/Integracion.test.js' being run, followed by the output: 'PASS src/tests/Integracion.test.js'. Below this, it says 'Pruebas de integración' and '✓ combina creación y listado de cursos (3 ms)'. The output also includes statistics: 'Test Suites: 1 passed, 1 total', 'Tests: 1 passed, 1 total', 'Snapshots: 0 total', and 'Time: 0.919 s'. The message 'Ran all test suites matching src/tests/Integracion.test.js.' is at the end. The status bar at the bottom of the terminal window shows the path 'C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>'.

Prueba de rendimiento astro

En la imagen se muestra el entorno de trabajo con Astro, donde se ejecutó la prueba de rendimiento aplicada a los módulos Student y Course. El resultado en verde indica que la evaluación se realizó correctamente y que el sistema cumple con los tiempos de respuesta esperados.



The screenshot shows a dark-themed code editor interface. On the left is the Explorer sidebar, which displays the project structure for 'MICROSERVICIO-ASTRO'. The 'tests' folder contains several Jest test files, with 'Rendimiento.test.js' currently selected. The main workspace is a terminal window showing the output of a Jest command:

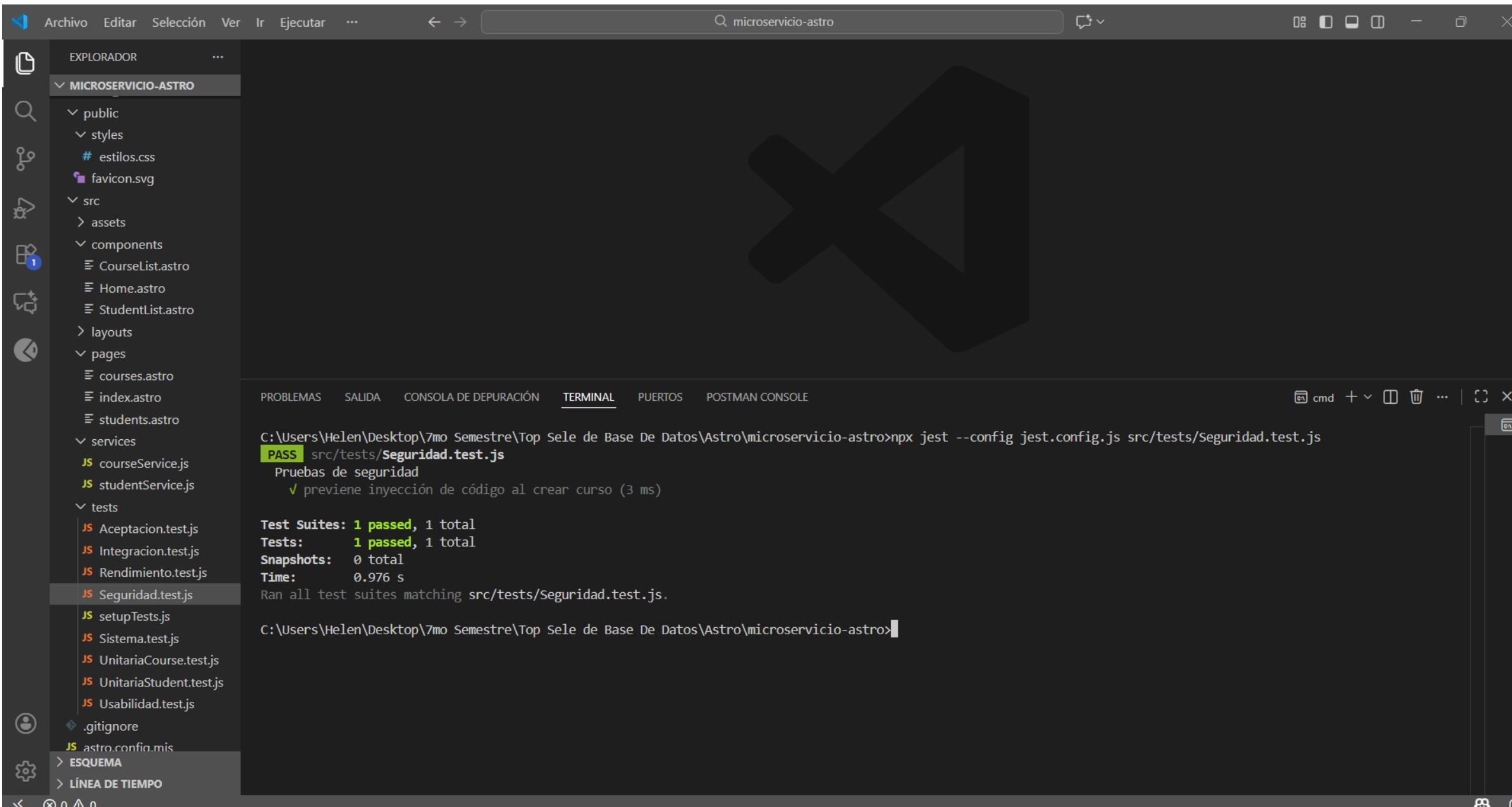
```
C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>npx jest --config jest.config.js src/tests/Rendimiento.test.js
PASS  src/tests/Rendimiento.test.js
  Pruebas de rendimiento - CourseService
    ✓ obtiene cursos rápidamente (3 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:  0 total
Time:        0.99 s
Ran all test suites matching src/tests/Rendimiento.test.js.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>
```

Prueba seguridad astro

En la imagen se aprecia el entorno de trabajo con Astro, donde se ejecutó la prueba de seguridad de manera conjunta para los módulos Student y Course. El resultado en verde confirma que la evaluación se completó satisfactoriamente, garantizando la protección y el correcto manejo de los datos.



The screenshot shows a dark-themed code editor interface. On the left is the Explorer sidebar, which displays the project structure for 'MICROSERVICIO-ASTRO'. The 'tests' folder contains several Jest test files, with 'Seguridad.test.js' currently selected. The main workspace is mostly blacked out, but the terminal window at the bottom is active, showing the output of a Jest run:

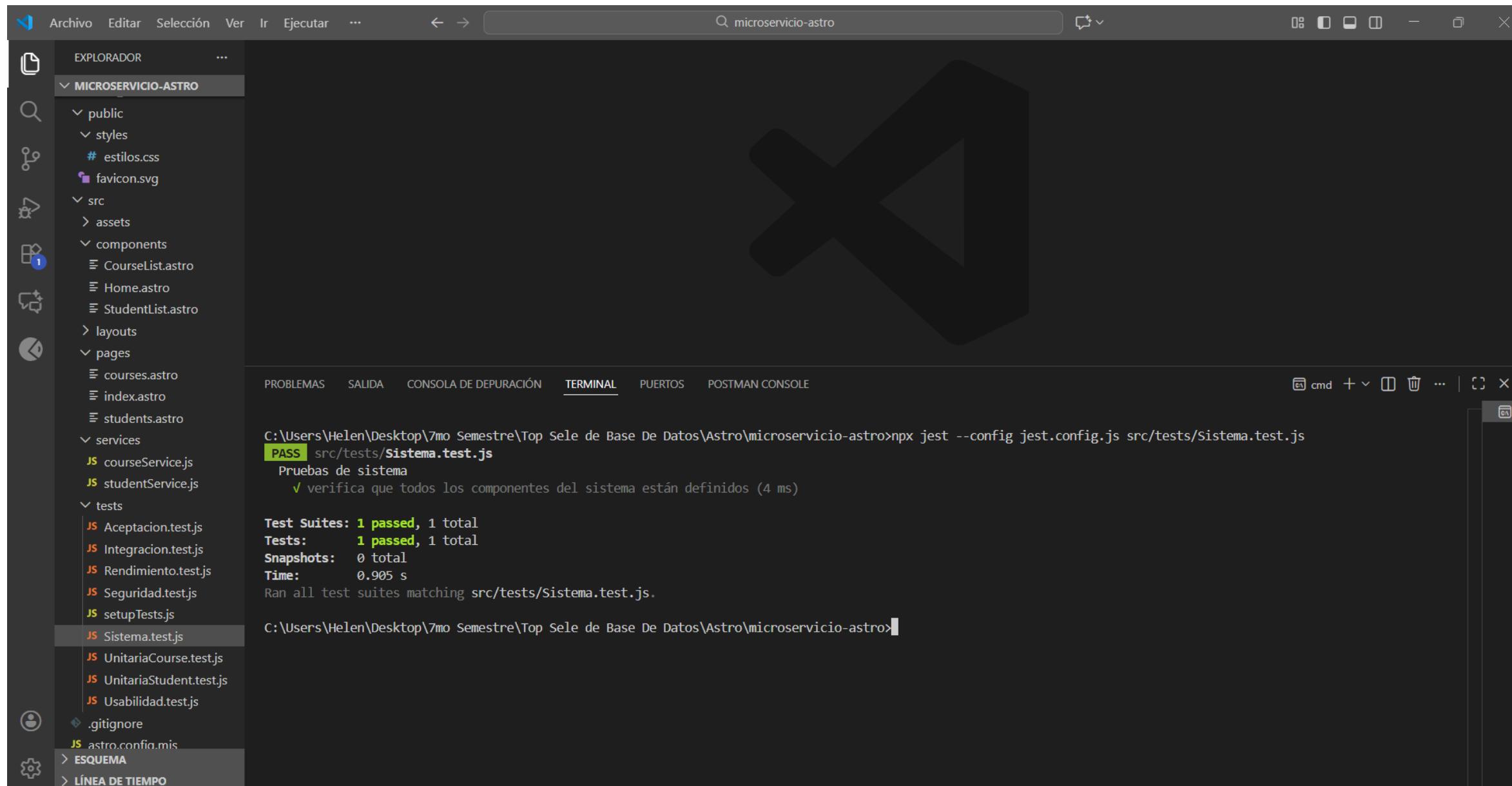
```
C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>npx jest --config jest.config.js src/tests/Seguridad.test.js
PASS  src/tests/Seguridad.test.js
  Pruebas de seguridad
    ✓ previene inyección de código al crear curso (3 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:  0 total
Time:        0.976 s
Ran all test suites matching src/tests/Seguridad.test.js.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>
```

Prueba de sistema astro

La imagen muestra el entorno desarrollado con Astro, donde se llevó a cabo la prueba de sistema aplicada de manera conjunta a los módulos Student y Course. El indicador en verde confirma que la prueba se ejecutó correctamente y que el funcionamiento general del sistema es adecuado.



The screenshot shows a dark-themed terminal window from the VS Code IDE. The title bar reads "microservicio-astro". The left sidebar displays the project structure under "EXPLORADOR", including "public", "src" (with "assets", "components", "layouts", and "pages" subfolders), "services" (with "courseService.js" and "studentService.js"), and "tests" (with "Aceptacion.test.js", "Integracion.test.js", "Rendimiento.test.js", "Seguridad.test.js", "setupTests.js", "Sistema.test.js", "UnitariaCourse.test.js", "UnitariaStudent.test.js", and "Usabilidad.test.js"). The "TERMINAL" tab is active, showing the command "npx jest --config jest.config.js src/tests/Sistema.test.js" and its output:

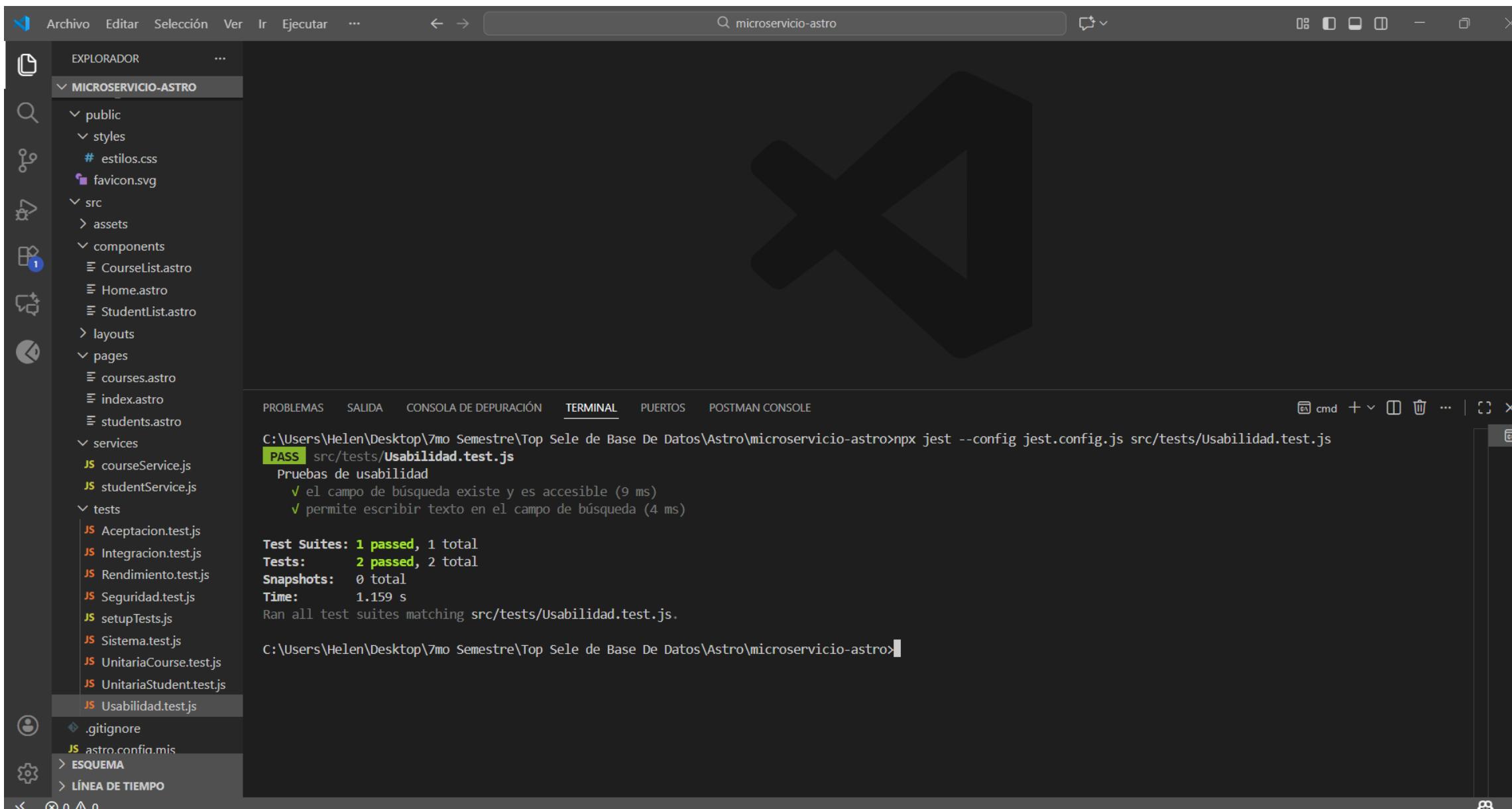
```
C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>npx jest --config jest.config.js src/tests/Sistema.test.js
PASS  src/tests/Sistema.test.js
  Pruebas de sistema
    ✓ verifica que todos los componentes del sistema están definidos (4 ms)

Test Suites: 1 passed, 1 total
Tests:       1 passed, 1 total
Snapshots:  0 total
Time:        0.905 s
Ran all test suites matching src/tests/Sistema.test.js.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>
```

Prueba usabilidad astro

La imagen refleja el entorno de trabajo con Astro, donde se ejecutó la prueba de usabilidad de manera conjunta para los módulos Student y Course. El resultado en verde indica que la evaluación se completó satisfactoriamente, confirmando que la interfaz es clara y funcional para el usuario.



The screenshot shows a dark-themed code editor interface, likely VS Code, with a terminal window open at the bottom. The terminal window displays the output of a Jest test run for a file named `Usabilidad.test.js`. The output is as follows:

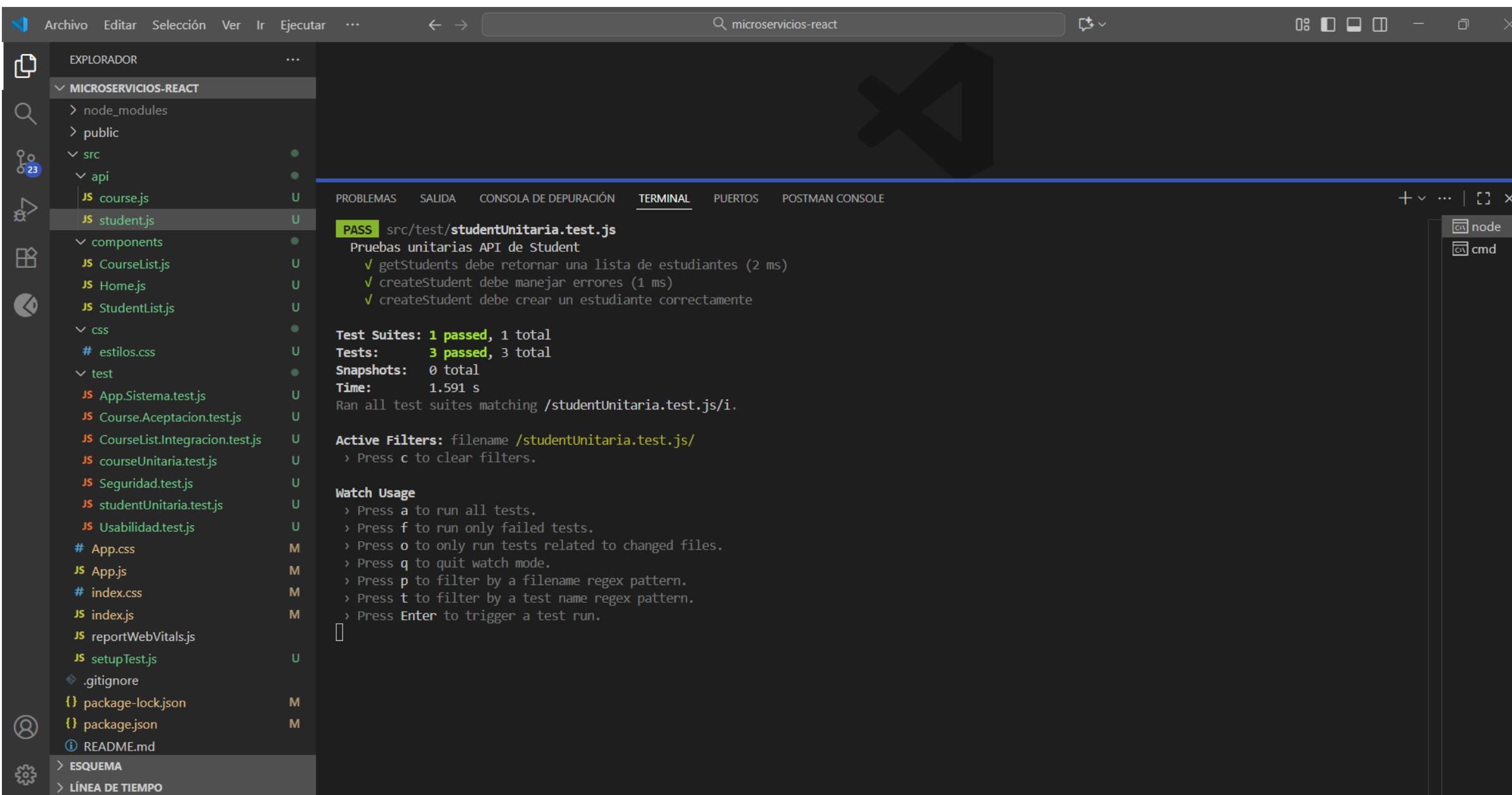
```
C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>npx jest --config jest.config.js src/tests/Usabilidad.test.js
PASS  src/tests/Usabilidad.test.js
  Pruebas de usabilidad
    ✓ el campo de búsqueda existe y es accesible (9 ms)
    ✓ permite escribir texto en el campo de búsqueda (4 ms)

Test Suites: 1 passed, 1 total
Tests:       2 passed, 2 total
Snapshots:   0 total
Time:        1.159 s
Ran all test suites matching src/tests/Usabilidad.test.js.

C:\Users\Helen\Desktop\7mo Semestre\Top Sele de Base De Datos\Astro\microservicio-astro>
```

Prueba unitaria react student

La imagen muestra el entorno de trabajo con React, donde se llevó a cabo la prueba unitaria del módulo Student. El resultado en verde indica que la ejecución fue exitosa y que el componente funciona correctamente.



The screenshot shows the Visual Studio Code interface with a dark theme. On the left is the Explorer sidebar, which lists the project structure under 'MICROSERVICIOS-REACT'. The 'src/api' folder contains 'course.js' and 'student.js'. The 'src/test' folder contains several test files like 'App.Sistema.test.js', 'Course.Aceptacion.test.js', and 'studentUnitaria.test.js'. The main editor area displays the output of a terminal command. The terminal tab is active, showing the results of a Jest test run:

```
PASS src/test/studentUnitaria.test.js
  Pruebas unitarias API de Student
    ✓ getStudents debe retornar una lista de estudiantes (2 ms)
    ✓ createStudent debe manejar errores (1 ms)
    ✓ createStudent debe crear un estudiante correctamente

  Test Suites: 1 passed, 1 total
  Tests:       3 passed, 3 total
  Snapshots:  0 total
  Time:        1.591 s
  Ran all test suites matching /studentUnitaria.test.js/i.

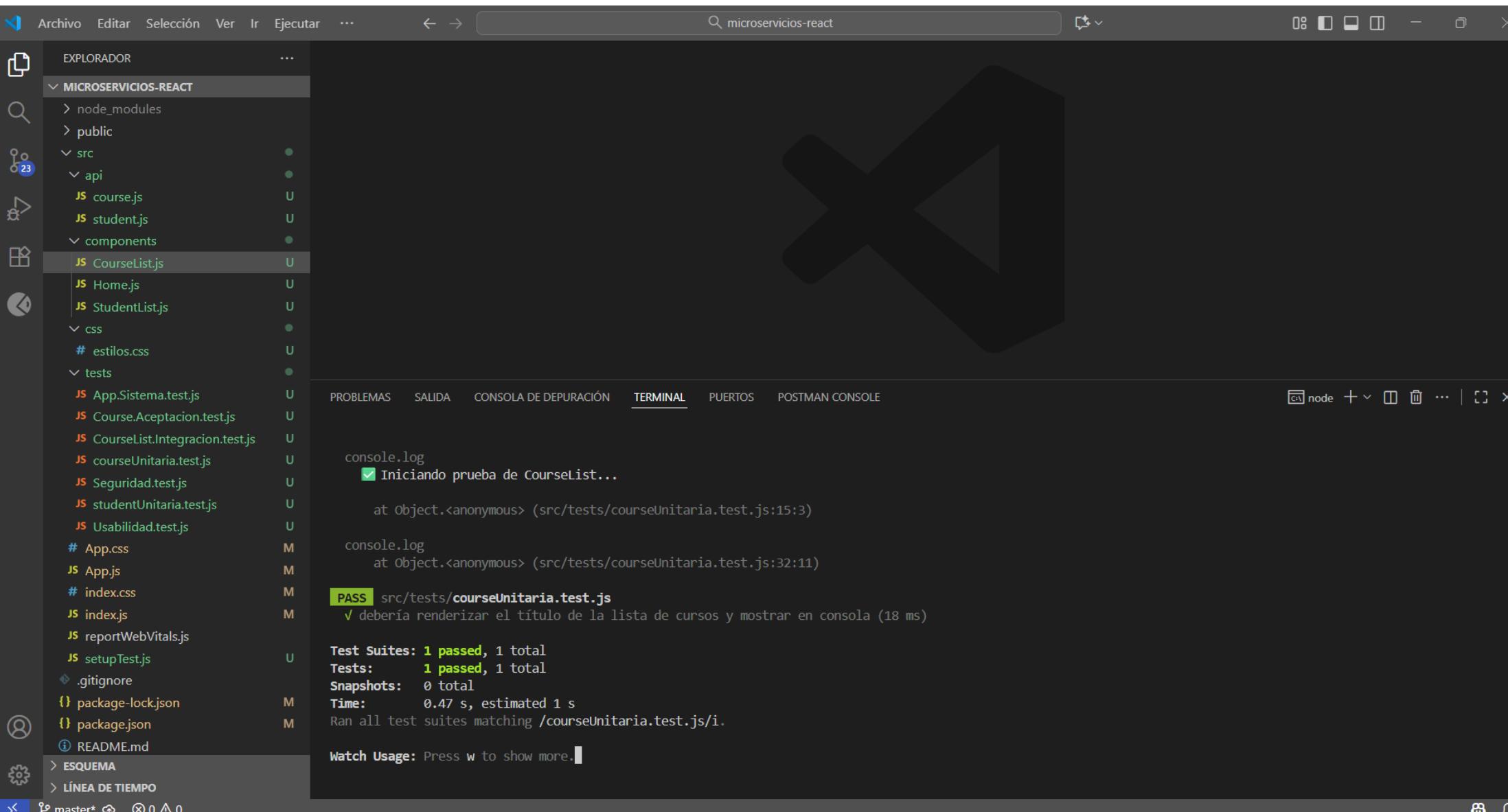
  Active Filters: filename /studentUnitaria.test.js/
    > Press c to clear filters.

  Watch Usage
    > Press a to run all tests.
    > Press f to run only failed tests.
    > Press o to only run tests related to changed files.
    > Press q to quit watch mode.
    > Press p to filter by a filename regex pattern.
    > Press t to filter by a test name regex pattern.
    > Press Enter to trigger a test run.
```

The terminal also shows two tabs: 'node' and 'cmd'.

Prueba unitaria react course

Como se puede observar en la siguiente imagen, se está trabajando con el framework NestJS. En el módulo Course se ha ejecutado la prueba unitaria, la cual actualmente se muestra en color verde, indicando que se ha completado correctamente.



The screenshot shows the Visual Studio Code interface with the following details:

- Explorador (Sidebar):** Shows the project structure under "MICROSERVICIOS-REACT". The "tests" folder contains several test files: "App.Sistema.test.js", "Course.Aceptacion.test.js", "CourseList.Integracion.test.js", "courseUnitaria.test.js", "Seguridad.test.js", "studentUnitaria.test.js", and "Usabilidad.test.js".
- Terminal (Bottom):** Displays the output of a test run.

```
console.log
  ✓ Iniciando prueba de CourseList...
  at Object.<anonymous> (src/tests/courseUnitaria.test.js:15:3)

  console.log
  at Object.<anonymous> (src/tests/courseUnitaria.test.js:32:11)

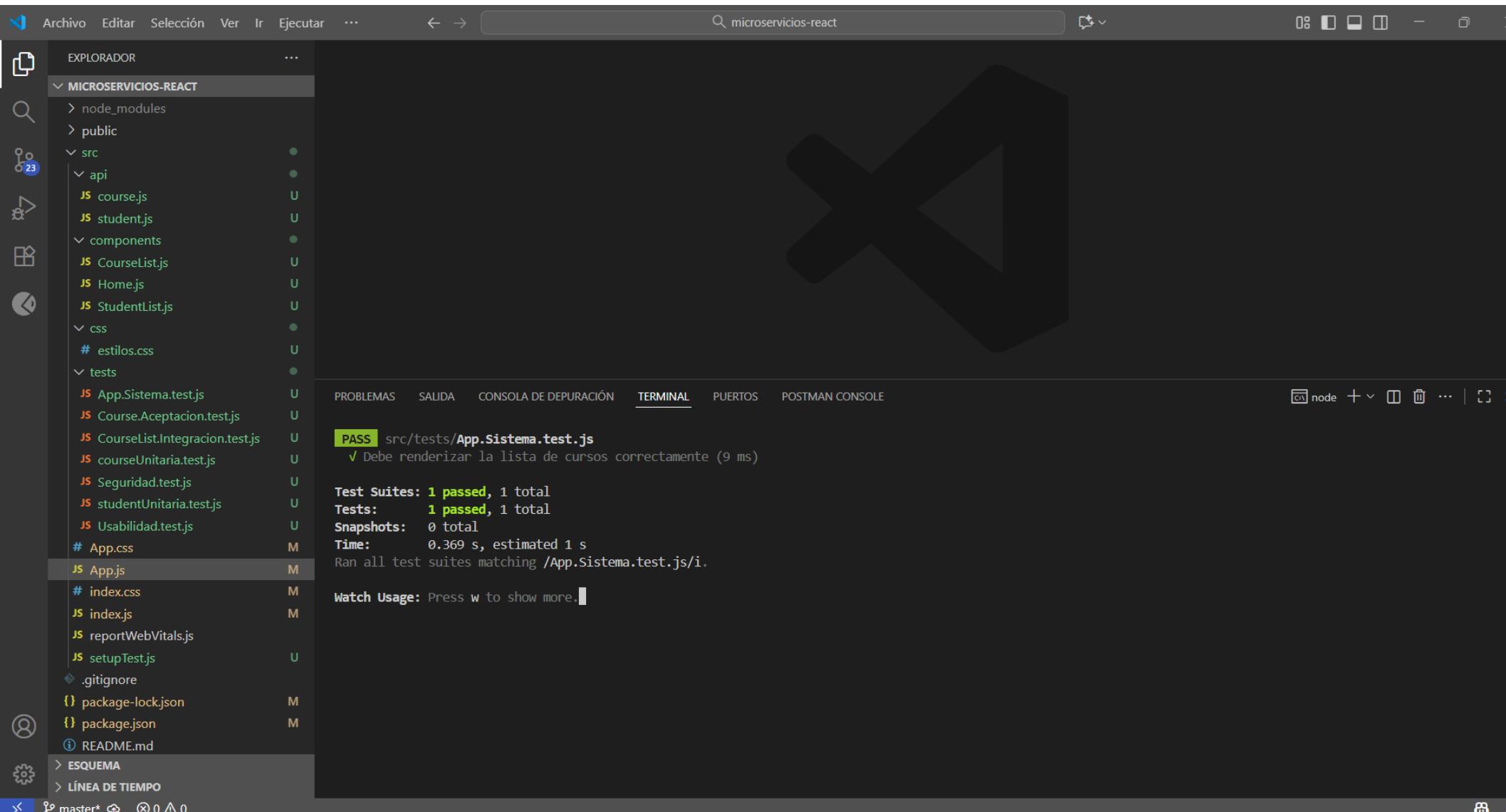
  PASS  src/tests/courseUnitaria.test.js
    ✓ debería renderizar el título de la lista de cursos y mostrar en consola (18 ms)

  Test Suites: 1 passed, 1 total
  Tests:       1 passed, 1 total
  Snapshots:  0 total
  Time:        0.47 s, estimated 1 s
  Ran all test suites matching /courseUnitaria.test.js/i.

  Watch Usage: Press w to show more.
```

Prueba del sistema en react

Como se puede observar en la siguiente imagen, se está trabajando con el framework React. Se realizó la prueba de sistema de manera general para los módulos Student y Course, la cual actualmente se muestra en color verde, indicando que se ha completado correctamente



The screenshot shows a terminal window within a development environment. The left side displays a file explorer with a project structure named 'MICROSERVICIOS-REACT'. The 'src' folder contains 'api', 'components', 'css', and 'tests' subfolders. The 'tests' folder contains several test files: 'App.Sistema.test.js', 'Course.Aceptacion.test.js', 'CourseList.Integracion.test.js', 'courseUnitaria.test.js', 'Seguridad.test.js', 'studentUnitaria.test.js', 'Usabilidad.test.js', 'App.css', 'App.js', 'index.css', 'index.js', 'reportWebVitals.js', 'setupTest.js', '.gitignore', 'package-lock.json', 'package.json', and 'README.md'. The right side of the window shows the terminal output. It starts with a green 'PASS' message: 'src/tests/App.Sistema.test.js' followed by a checkmark and the text 'Debe renderizar la lista de cursos correctamente (9 ms)'. Below this, it shows test statistics: 'Test Suites: 1 passed, 1 total', 'Tests: 1 passed, 1 total', 'Snapshots: 0 total', 'Time: 0.369 s, estimated 1 s', and 'Ran all test suites matching /App.Sistema.test.js/i.' At the bottom, there is a note: 'Watch Usage: Press w to show more.'

Prueba de aceptación en react

Como se muestra en la siguiente imagen, se está trabajando con el framework React. Se llevó a cabo la prueba de aceptación de manera general para los módulos Student y Course, la cual actualmente aparece en color verde, indicando que se ha completado correctamente.

The screenshot shows a Microsoft Visual Studio Code (VS Code) interface with the following details:

- File Explorer (Left):** Shows the project structure under "MICROSERVICIOS-REACT". The "tests" folder contains several files: "App.Sistema.test.js", "Course.Aceptacion.test.js" (which is currently selected), "CourseList.Integracion.test.js", "courseUnitaria.test.js", "Seguridad.test.js", "studentUnitaria.test.js", and "Usabilidad.test.js". Other files like "App.css", "index.css", and "reportWebVitals.js" are also listed.
- Terminal (Bottom):** The terminal window displays the output of a test run:

```
PASS  src/tests/course.Aceptacion.test.js
  ✓ El usuario puede agregar un curso (84 ms)

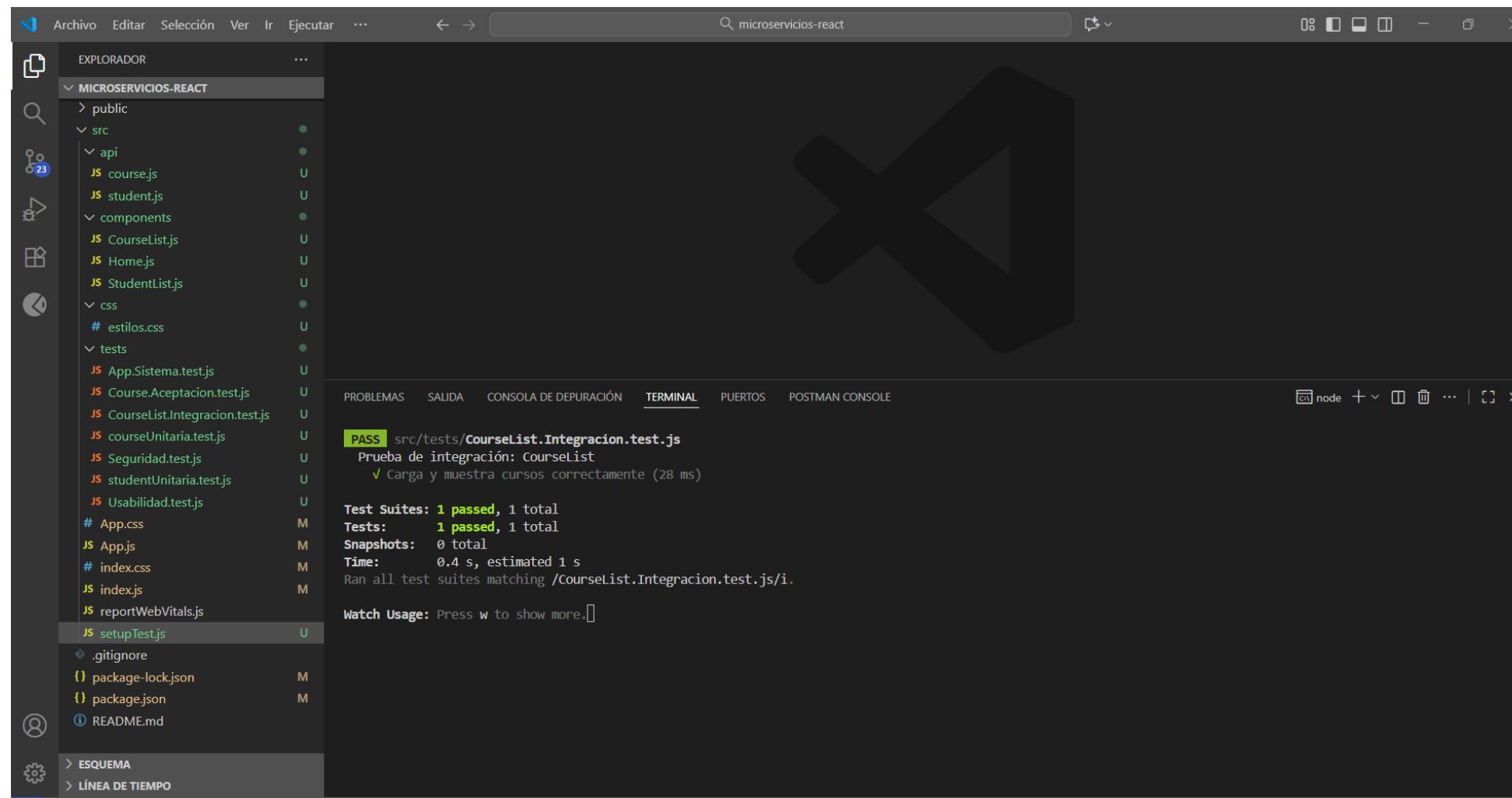
Test Suites: 1 passed, 1 total
Tests:    1 passed, 1 total
Snapshots: 0 total
Time:    1.608 s, estimated 2 s
Ran all test suites matching /Course.Aceptacion.test.js/i.

Active Filters: filename /Course.Aceptacion.test.js/
  > Press c to clear filters.

Watch Usage
  > Press a to run all tests.
  > Press f to run only failed tests.
  > Press o to only run tests related to changed files.
  > Press q to quit watch mode.
  > Press p to filter by a filename regex pattern.
  > Press t to filter by a test name regex pattern.
  > Press Enter to trigger a test run.
```

Prueba de integración en react

Como se puede observar en la siguiente imagen, se está trabajando con el framework React. Se realizó la prueba de integración de manera general para los módulos Student y Course, la cual actualmente se muestra en color verde, indicando que se ha completado correctamente.



The screenshot shows a Microsoft Visual Studio Code (VS Code) interface with a dark theme. On the left is the Explorer sidebar, which displays the project structure under 'MICROSERVICIOS-REACT'. The 'src' folder contains 'api', 'components', 'css', and 'tests' subfolders. Inside 'tests', there are several JavaScript files: 'App.Sistema.test.js', 'Course.Aceptacion.test.js', 'CourseList.Integracion.test.js', 'courseUnitaria.test.js', 'Seguridad.test.js', 'studentUnitaria.test.js', 'Usabilidad.test.js', 'App.css', 'App.js', 'index.css', 'index.js', 'reportWebVitals.js', and 'setupTest.js'. The 'CourseList.Integracion.test.js' file is currently selected. The main workspace area shows a large 'X' logo. Below the workspace are tabs for 'PROBLEMAS', 'SALIDA', 'CONSOLA DE DEPURACIÓN', 'TERMINAL' (which is active), 'PUERTOS', and 'POSTMAN CONSOLE'. The terminal tab displays the output of a test run:

```
PASS src/tests/CourseList.Integracion.test.js
Prueba de integración: CourseList
  ✓ Carga y muestra cursos correctamente (28 ms)

Test Suites: 1 passed, 1 total
Tests:    1 passed, 1 total
Snapshots: 0 total
Time:    0.4 s, estimated 1 s
Ran all test suites matching /CourseList.Integracion.test.js/i.

Watch Usage: Press w to show more.[]
```

Prueba de rendimiento react

La siguiente imagen muestra la ejecución de la prueba de rendimiento en React para los módulos Student y Course, la cual se encuentra en color verde, indicando resultados correctos.

The screenshot shows a terminal window within a code editor interface. The terminal tab is active, displaying the output of a build process:

```
src > JS index.js > ...
1 import React from 'react';
2 import ReactDOM from 'react-dom/client';
3 import './index.css';
4 import App from './App';
5 import reportWebVitals from './reportWebVitals'; // solo una vez
6

PROBLEMAS SALIDA CONSOLA DE DEPURACIÓN TERMINAL PUERTOS POSTMAN CONSOLE
Compiled successfully!

You can now view microservicios-react in the browser.

Local: http://localhost:3000
On Your Network: http://192.168.100.14:3000

Note that the development build is not optimized.
To create a production build, use npm run build.

webpack compiled successfully
```

The terminal output indicates a successful compilation and provides local and network URLs to view the application. The code editor's sidebar shows the project structure, including files like `index.js`, `reportWebVitals.js`, and test files for `Course` and `Student`.

Prueba de usabilidad react

La imagen siguiente muestra la prueba de usabilidad realizada en React para los módulos Student y Course, la cual se encuentra en color verde, indicando resultados satisfactorios.

The screenshot shows a terminal window within a code editor interface, specifically running a test script. The terminal output is as follows:

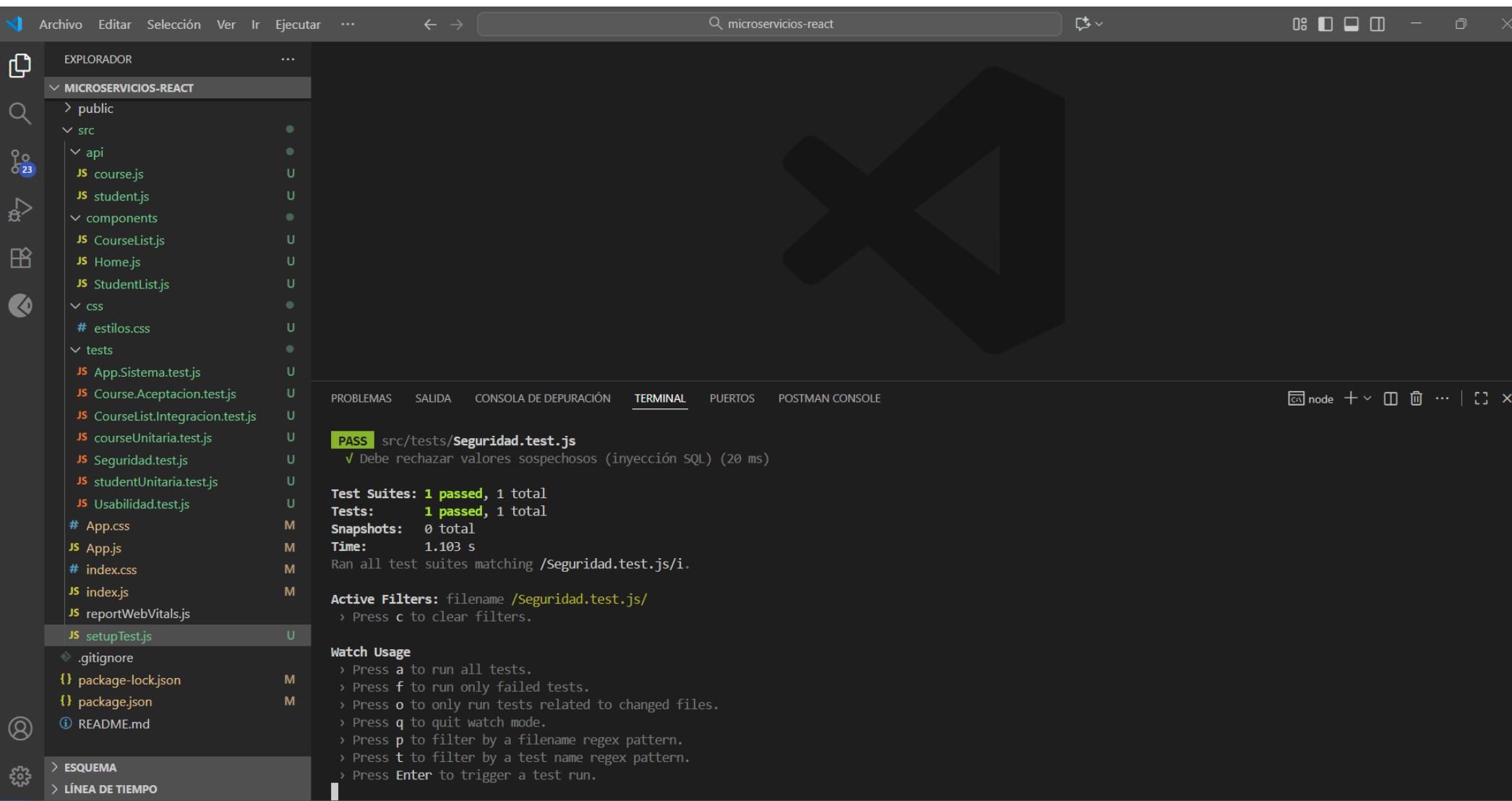
```
PASS  src/tests/Usabilidad.test.js
Prueba de usabilidad: filtrado en CourseList
  ✓ El campo de búsqueda filtra correctamente (228 ms)

Test Suites: 1 passed, 1 total
Tests:    1 passed, 1 total
Schemas:  0 total
Time:    1.125 s
Ran all test suites matching /Usabilidad.test.js/i.

Watch Usage: Press w to show more.
```

Prueba de seguridad react

La imagen siguiente muestra la prueba de seguridad realizada en React para los módulos Student y Course, la cual se encuentra en color verde, indicando resultados satisfactorios



The screenshot shows a dark-themed code editor interface, likely VS Code, displaying a terminal window with test results. The terminal output is as follows:

```
PASS  src/tests/Seguridad.test.js
  ✓ Debe rechazar valores sospechosos (inyección SQL) (20 ms)

Test Suites: 1 passed, 1 total
Tests:     1 passed, 1 total
Snapshots: 0 total
Time:      1.103 s
Ran all test suites matching /Seguridad.test.js/i.

Active Filters: filename /Seguridad.test.js/
  > Press c to clear filters.

Watch Usage
  > Press a to run all tests.
  > Press f to run only failed tests.
  > Press o to only run tests related to changed files.
  > Press q to quit watch mode.
  > Press p to filter by a filename regex pattern.
  > Press t to filter by a test name regex pattern.
  > Press Enter to trigger a test run.
```

Conclusión

La realización de pruebas integrales en los microservicios *Student* y *Course*, desarrollados con React, Astro, NestJS y Angular, permitió verificar el correcto funcionamiento, la estabilidad en la comunicación y la seguridad de los módulos. Los resultados positivos obtenidos en pruebas de unidad, integración, aceptación, seguridad, sistema, rendimiento y usabilidad confirman la fiabilidad y eficiencia del software, además de garantizar una experiencia de usuario adecuada. Estas evaluaciones fortalecen la calidad del proyecto y aseguran que los microservicios estén preparados para su implementación, mantenimiento y posible expansión en entornos profesionales.