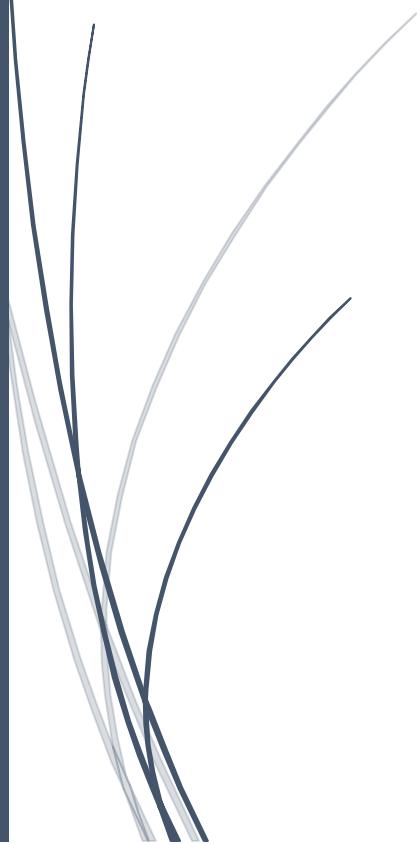




8-11-2025

Evaluación parcial N°2.



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DUOC UC 2025.
Clase: Ciclo de Vida del Software I - 001V
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Evaluación parcial N°2.

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Contenido

1. Introducción	2
2. Fase 1: Configuración de Entorno y Repositorios	2
3. Fase 2: Preparación del Proyecto Base	4
4. Fase 3: Instalación y Pruebas Iniciales	6
5. Fase 4: Personalización y Extensión de Pruebas	13
6. Fase 5: Implementación de Linting (ESLint).....	24
7. Fase 6: Implementación de TDD y BDD	35
8. Fase 7: Configuración de Integración Continua (CI).....	45
9. Fase 8: Creación y Gestión de Pull Request (PR)	49
10. Conclusión	56

1. Introducción

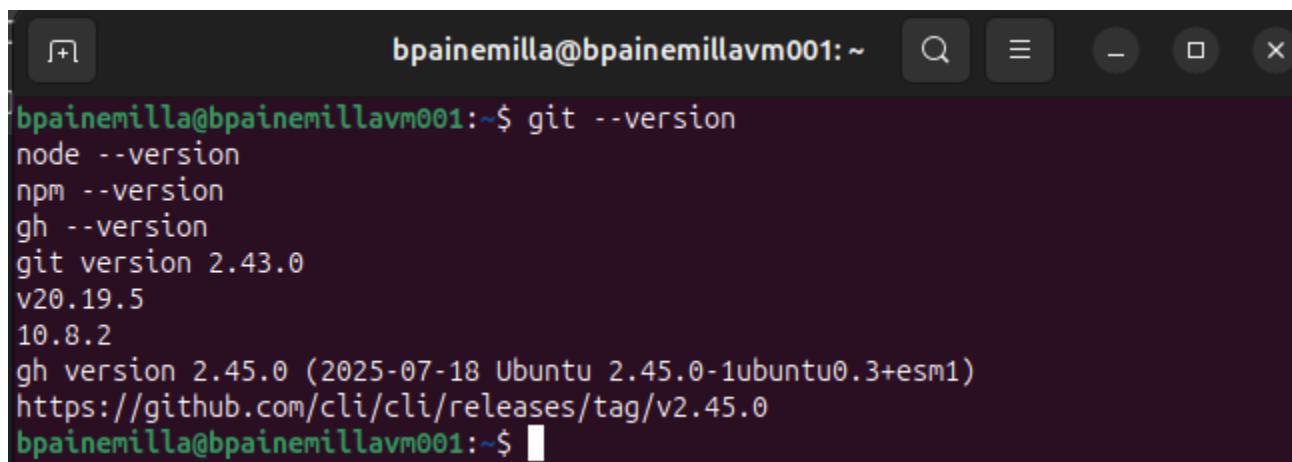
El presente informe detalla el proceso de desarrollo e implementación de un pipeline de integración continua (CI) como parte de la Evaluación Parcial N°2 de la asignatura "Ciclo de Vida del Software I". El trabajo abarca desde la configuración inicial del entorno y repositorios, la clonación de un proyecto base, la ejecución y expansión de pruebas (unitarias, TDD, BDD), hasta la configuración de un pipeline completo de CI/CD con GitHub Actions, incluyendo análisis de vulnerabilidades y calidad de código.

2. Fase 1: Configuración de Entorno y Repositorios

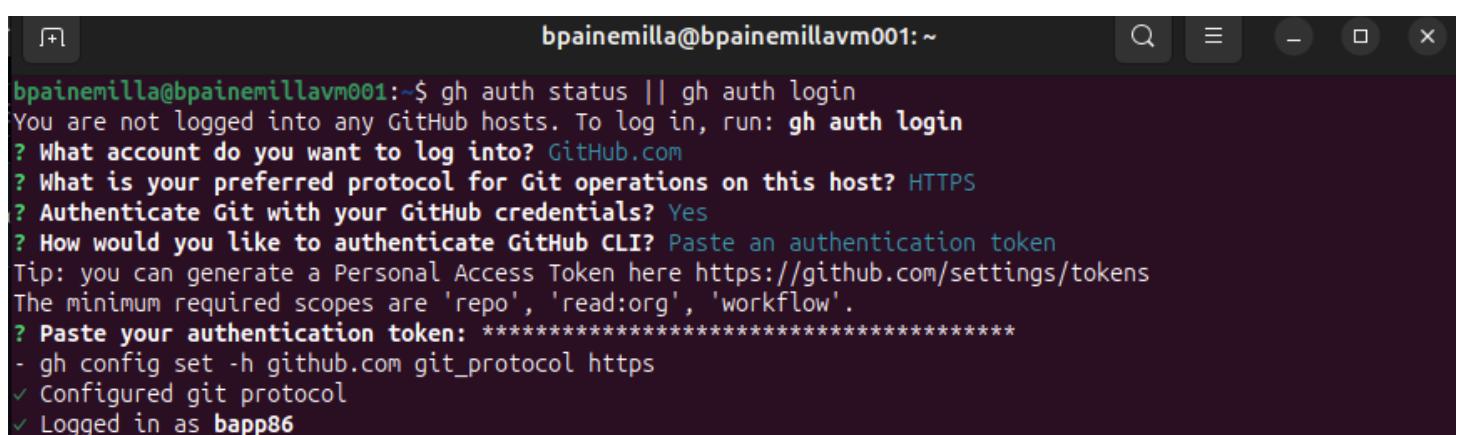
2.1. Verificación de Herramientas

Se inició el proceso verificando las versiones de las herramientas de desarrollo instaladas en el entorno local. Las versiones confirmadas fueron:

- **Git:** 2.43.0
- **Node:** v20.19.5
- **NPM:** 10.8.2
- **GitHub CLI (gh):** 2.45.0



```
bpainemilla@bpainemillavm001:~$ git --version
node --version
npm --version
gh --version
git version 2.43.0
v20.19.5
10.8.2
gh version 2.45.0 (2025-07-18 Ubuntu 2.45.0-1ubuntu0.3+esm1)
https://github.com/cli/cli/releases/tag/v2.45.0
bpainemilla@bpainemillavm001:~$
```

A screenshot of a terminal window showing the output of the 'git --version' command. The terminal title is 'bpainemilla@bpainemillavm001:~'. The output shows the versions of Git, Node.js, NPM, and GitHub CLI.

```
bpainemilla@bpainemillavm001:~$ gh auth status || gh auth login
You are not logged into any GitHub hosts. To log in, run: gh auth login
? What account do you want to log into? GitHub.com
? What is your preferred protocol for Git operations on this host? HTTPS
? Authenticate Git with your GitHub credentials? Yes
? How would you like to authenticate GitHub CLI? Paste an authentication token
Tip: you can generate a Personal Access Token here https://github.com/settings/tokens
The minimum required scopes are 'repo', 'read:org', 'workflow'.
? Paste your authentication token: *****
- gh config set -h github.com git_protocol https
✓ Configured git protocol
✓ Logged in as bapp86
```

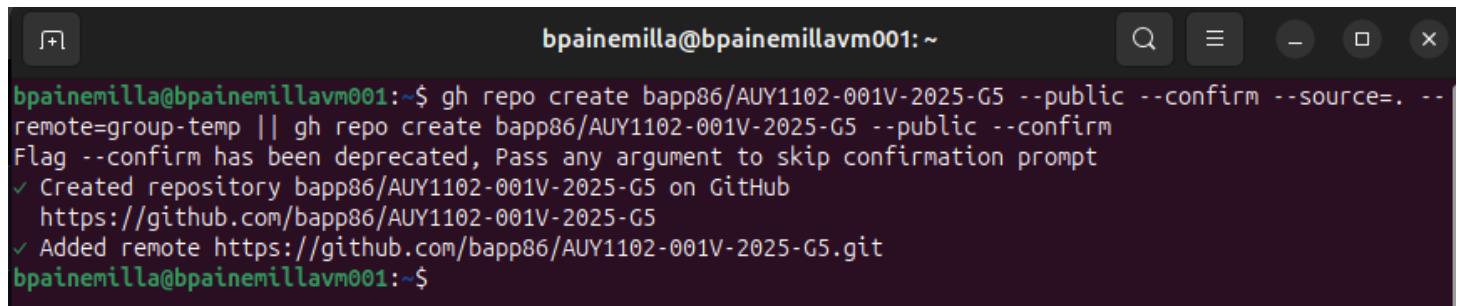
A screenshot of a terminal window showing the output of the 'gh auth status || gh auth login' command. The terminal title is 'bpainemilla@bpainemillavm001:~'. The output guides the user through the GitHub CLI authentication process, including selecting an account, choosing a protocol, and pasting a personal access token.

2.2. Autenticación y Creación de Repositorio en GitHub

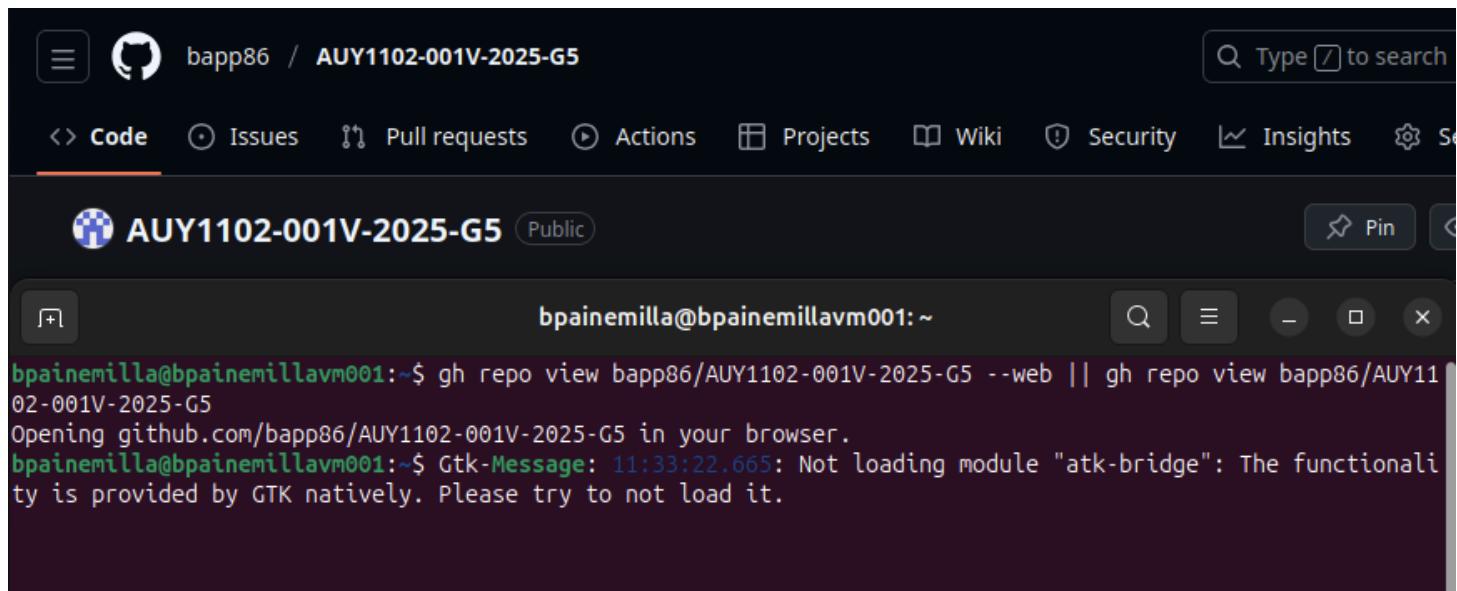
Se procedió a autenticar el cliente de línea de comandos de GitHub (GitHub CLI) contra GitHub.com. Se utilizó el protocolo **HTTPS** y se autenticó mediante un **token de acceso personal**, iniciando sesión exitosamente como el usuario bapp86

Posteriormente, se creó un nuevo repositorio público en GitHub para el grupo:

- **Nombre del Repositorio:** bapp86/AUY1102-001V-2025-G5
- **URL:** <https://github.com/bapp86/AUY1102-001V-2025-G5>



```
bpainemilla@bpainemillavm001:~$ gh repo create bapp86/AUY1102-001V-2025-G5 --public --confirm --source=. --remote=group-temp || gh repo create bapp86/AUY1102-001V-2025-G5 --public --confirm
Flag --confirm has been deprecated, Pass any argument to skip confirmation prompt
✓ Created repository bapp86/AUY1102-001V-2025-G5 on GitHub
  https://github.com/bapp86/AUY1102-001V-2025-G5
✓ Added remote https://github.com/bapp86/AUY1102-001V-2025-G5.git
bpainemilla@bpainemillavm001:~$
```



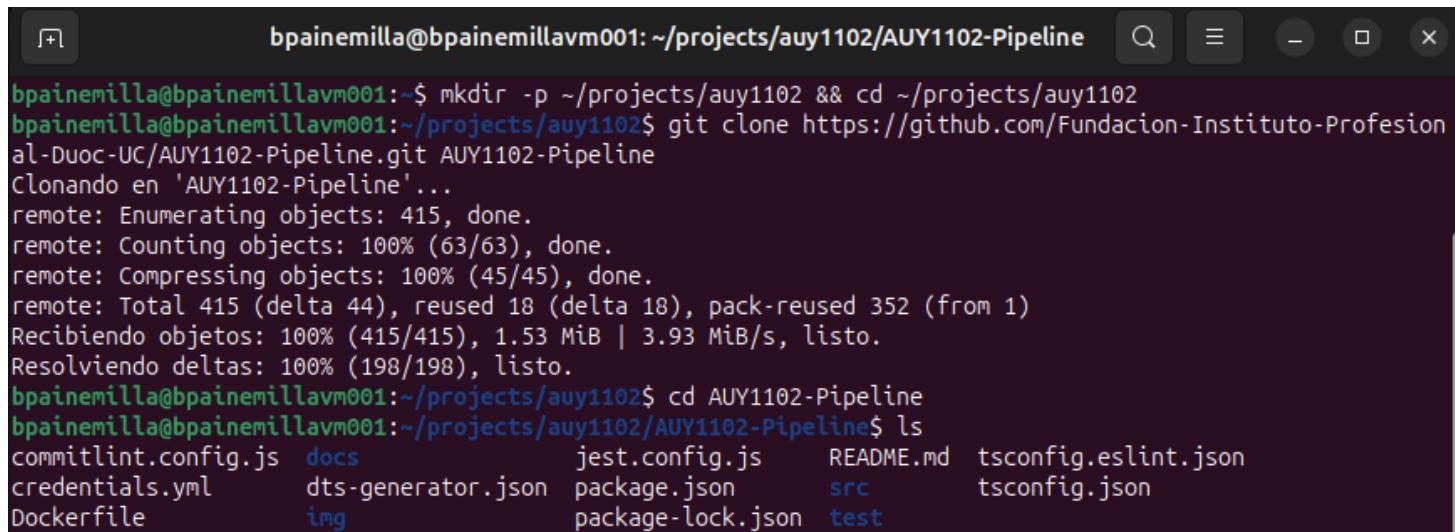
The screenshot shows the GitHub repository page for "bapp86 / AUY1102-001V-2025-G5". The repository is public. Below the header, there is a terminal window showing the command used to create the repository and its URL. A message at the bottom indicates a GTK loading error.

```
bpainemilla@bpainemillavm001:~$ gh repo view bapp86/AUY1102-001V-2025-G5 --web || gh repo view bapp86/AUY1102-001V-2025-G5
Opening github.com/bapp86/AUY1102-001V-2025-G5 in your browser.
bpainemilla@bpainemillavm001:~$ Gtk-Message: 11:33:22.665: Not loading module "atk-bridge": The functionality is provided by GTK natively. Please try to not load it.
```

3. Fase 2: Preparación del Proyecto Base

3.1. Clonación del Repositorio 'Pipeline'

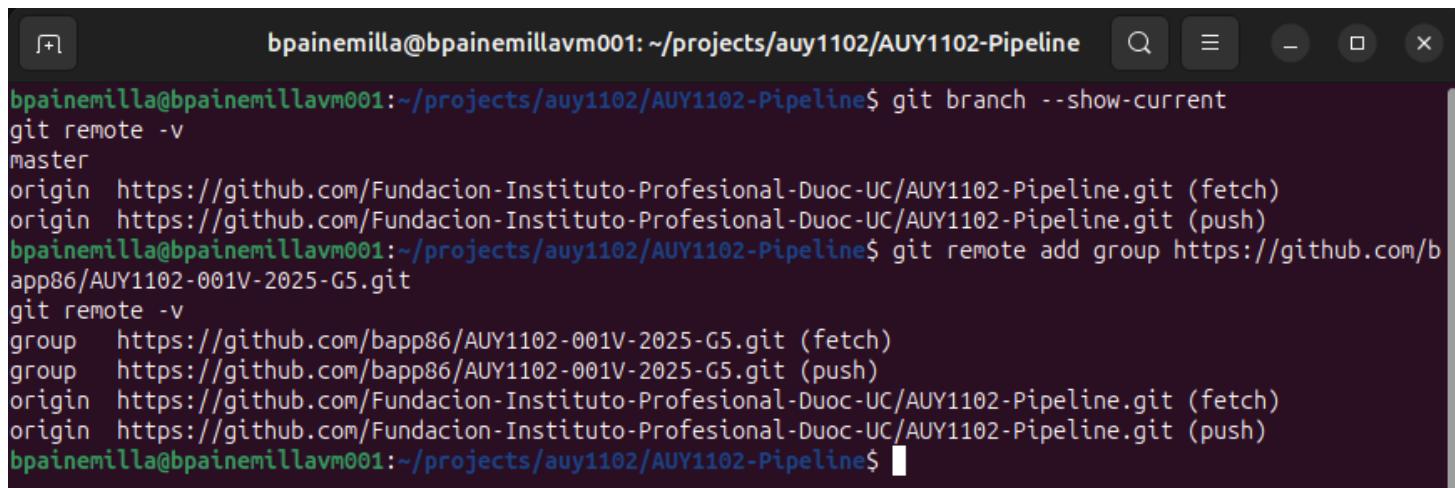
Se clonó el repositorio base proporcionado por la institución (Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline) en un directorio local (~/projects/auy1102/AUY1102-Pipeline).



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
bpainemilla@bpainemillavm001:~/projects/auy1102$ git clone https://github.com/Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline.git AUY1102-Pipeline
Clonando en 'AUY1102-Pipeline'...
remote: Enumerating objects: 415, done.
remote: Counting objects: 100% (63/63), done.
remote: Compressing objects: 100% (45/45), done.
remote: Total 415 (delta 44), reused 18 (delta 18), pack-reused 352 (from 1)
Recibiendo objetos: 100% (415/415), 1.53 MiB | 3.93 MiB/s, listo.
Resolviendo deltas: 100% (198/198), listo.
bpainemilla@bpainemillavm001:~/projects/auy1102$ cd AUY1102-Pipeline
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ ls
commitlint.config.js  docs          jest.config.js    README.md   tsconfig.eslint.json
credentials.yml       dts-generator.json package.json    src        tsconfig.json
Dockerfile            img           package-lock.json test
```

3.2. Configuración de Remotos y Sincronización Inicial

Dentro del repositorio clonado, se añadió un nuevo remoto Git denominado group, apuntando al repositorio del grupo creado en la fase anterior (<https://github.com/bapp86/AUY1102-001V-2025-G5.git>)



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git branch --show-current
git remote -v
master
origin  https://github.com/Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline.git (fetch)
origin  https://github.com/Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline.git (push)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git remote add group https://github.com/bapp86/AUY1102-001V-2025-G5.git
git remote -v
group  https://github.com/bapp86/AUY1102-001V-2025-G5.git (fetch)
group  https://github.com/bapp86/AUY1102-001V-2025-G5.git (push)
origin  https://github.com/Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline.git (fetch)
origin  https://github.com/Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline.git (push)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

Se realizó un push inicial de la rama master y todas las etiquetas (tags) existentes desde el repositorio local hacia el nuevo remoto group. Finalmente, se configuró Git para almacenar credenciales globalmente (credential.helper store)

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git push --set-upstream group master
Enumerando objetos: 377, listo.
Contando objetos: 100% (377/377), listo.
Compresión delta usando hasta 4 hilos
Comprimiendo objetos: 100% (207/207), listo.
Escribiendo objetos: 100% (377/377), 1.51 MiB | 3.10 MiB/s, listo.
Total 377 (delta 172), reusados 360 (delta 159), pack-reusados 0
remote: Resolving deltas: 100% (172/172), done.
To https://github.com/bapp86/AUY1102-001V-2025-G5.git
 * [new branch]      master -> master
rama 'master' configurada para rastrear 'group/master'.
```

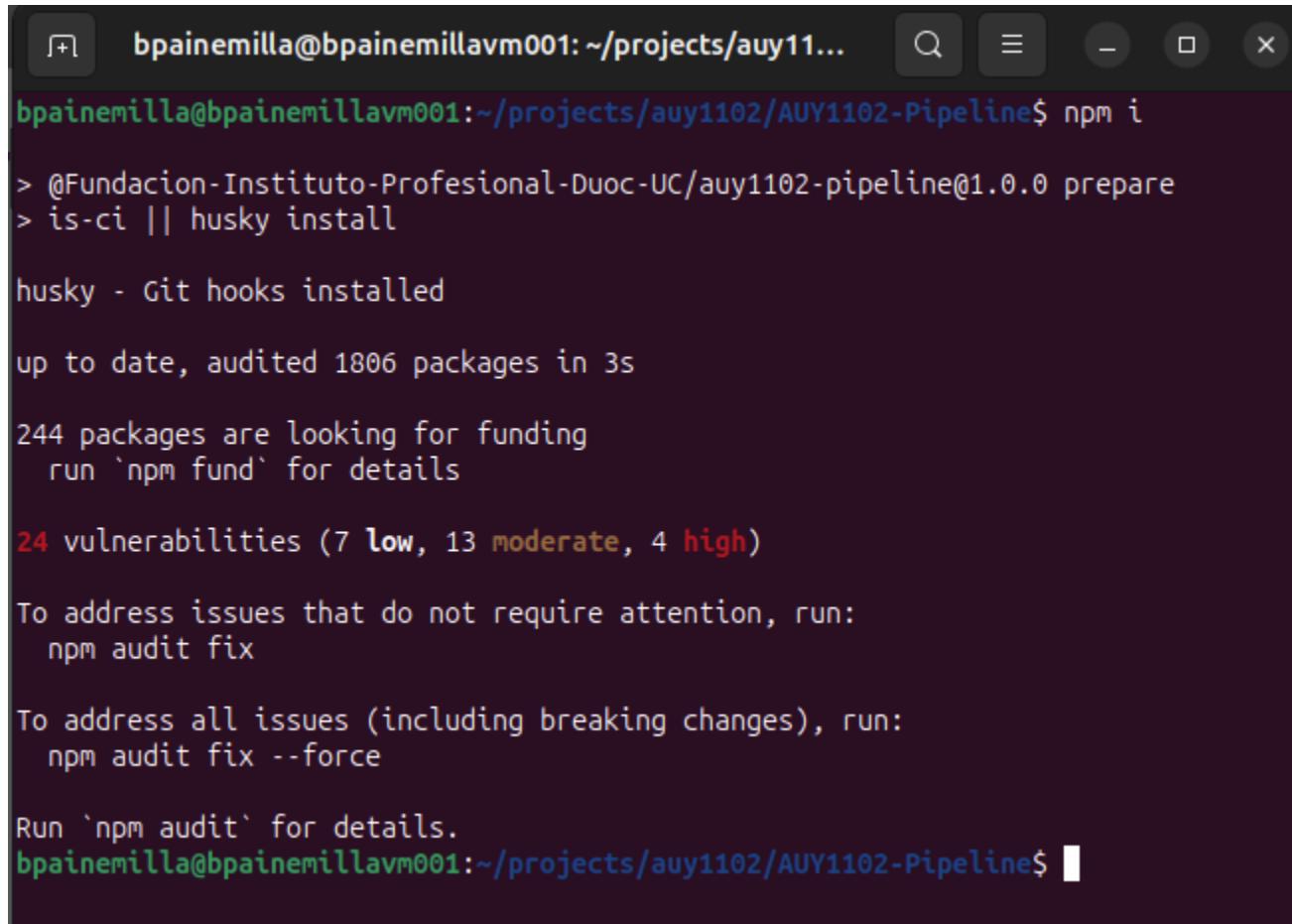
```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git push group --all
Everything up-to-date
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git push group --tags
Total 0 (delta 0), reusados 0 (delta 0), pack-reusados 0
To https://github.com/bapp86/AUY1102-001V-2025-G5.git
 * [new tag]          v1.0.0 -> v1.0.0
 * [new tag]          v1.1.0 -> v1.1.0
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git config --global credential.helper store
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

4. Fase 3: Instalación y Pruebas Iniciales

4.1. Instalación de Dependencias

Se ejecutó npm i para instalar las dependencias del proyecto definidas en package.json. El proceso auditó 1806 paquetes e informó la presencia de **24 vulnerabilidades** (7 bajas, 13 moderadas, 4 altas).



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npm i
> @Fundacion-Instituto-Profesional-Duoc-UC/auy1102-pipeline@1.0.0 prepare
> is-ci || husky install

husky - Git hooks installed

up to date, audited 1806 packages in 3s

244 packages are looking for funding
  run `npm fund` for details

24 vulnerabilities (7 low, 13 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

4.2. Ejecución de Pruebas Unitarias (Jest)

Se ejecutó el script de pruebas unitarias (npm run test:unit).

- **Resultado:** 10 suites de pruebas y 18 tests individuales pasaron exitosamente.
- **Observación:** Se detectaron errores no bloqueantes en la salida (Cannot log after tests are done. TypeError: fetch failed ... ENOTFOUND api.example.com), indicando un posible problema asíncrono en la configuración de las pruebas existentes.

```
bpainemilla@bpainemillavm001:~/projects/auy11... Q ≡ - x
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npm run test:unit

> @Fundacion-Instituto-Profesional-Duoc-UC/auy1102-pipeline@1.0.0 test:unit
> jest --passWithNoTests

PASS [ pkg-value-object ] test/value-object/primitives/NumberValueObject/isSmallerThan.test.ts
PASS [ pkg-value-object ] test/value-object/primitives/NumberValueObject/isBiggerThan.test.ts
PASS [ pkg-value-object ] test/value-object/primitives/StringValueObject/differentTo.test.ts
PASS [ pkg-value-object ] test/value-object/primitives/NumberValueObject>equalsTo.test.ts

● Cannot log after tests are done. Did you forget to wait for something async in your test?
  Attempted to log "Error: TypeError: fetch failed
    at node:internal/deps/undici/undici:13510:13
    at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}".

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:
```



```
bpainemilla@bpainemillavm001: ~/projects/auy11...          Q  ⌂  -  ⌂  ×  
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:  
10)    at src/index.ts:20:150  
  
PASS | pkg-value-object | test/value-object/primitives/StringValueObject/equalsT  
o.test.ts  
  
● Cannot log after tests are done. Did you forget to wait for something async  
in your test?  
  Attempted to log "Error: TypeError: fetch failed  
    at node:internal/deps/undici/undici:13510:13  
    at processTicksAndRejections (node:internal/process/task_queues:95:5) {  
      [cause]: Error: getaddrinfo ENOTFOUND api.example.com  
        at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {  
          errno: -3008,  
          code: 'ENOTFOUND',  
          syscall: 'getaddrinfo',  
          hostname: 'api.example.com'  
        }  
    }".  
  
    at processTicksAndRejections (node:internal/process/task_queues:95:5) {  
      [cause]: Error: getaddrinfo ENOTFOUND api.example.com  
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {  
      errno: -3008,  
      code: 'ENOTFOUND',  
      syscall: 'getaddrinfo',  
      hostname: 'api.example.com'  
    }  
  }".  
  at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:  
10)    at src/index.ts:20:150  
  
● Cannot log after tests are done. Did you forget to wait for something async  
in your test?  
  Attempted to log "Error: TypeError: fetch failed  
    at node:internal/deps/undici/undici:13510:13
```



```
bpainemilla@bpainemillavm001: ~/projects/auy11... Q - x

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
        errno: -3008,
        code: 'ENOTFOUND',
        syscall: 'getaddrinfo',
        hostname: 'api.example.com'
    }
}.

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
}
}
}.

at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150

PASS [pkg-value-object] test/value-object/primitives/StringValueObject/hasLess
CharacterThan.test.ts
PASS [pkg-value-object] test/value-object/primitives/StringValueObject/hasMore
CharacterThan.test.ts

● Cannot log after tests are done. Did you forget to wait for something async
in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
        errno: -3008,
        code: 'ENOTFOUND',
        syscall: 'getaddrinfo',
        hostname: 'api.example.com'
```



```
bpainemilla@bpainemillavm001: ~/projects/auy11... Q - x
}".
}

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:
10)
at src/index.ts:20:150

PASS | pkg-value-object | test/value-object/primitives/StringValueObject/isEmpty
.test.ts

● Cannot log after tests are done. Did you forget to wait for something async
in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}.
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
```



```
bpainemilla@bpainemillavm001: ~/projects/auy11... Q - x
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:
10)
  at src/index.ts:20:150

PASS [ pkg-value-object ] test/value-object/primitives/EnumValueObject/checkValueObject.test.ts
PASS [ pkg-value-object ] test/value-object/primitives/StringValueObject/toString.test.ts

● Cannot log after tests are done. Did you forget to wait for something async
in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
      errno: -3008,
      code: 'ENOTFOUND',
      syscall: 'getaddrinfo',
      hostname: 'api.example.com'
    }
}.
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:
10)
```

```
at src/index.ts:20:150
```

```
Test Suites: 10 passed, 10 total
Tests:       18 passed, 18 total
Snapshots:   0 total
Time:        3.092 s
Ran all test suites.
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

Posteriormente, se instaló la dependencia de desarrollo nyc para la generación de reportes de pruebas.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npm install --save-dev nyc

added 50 packages, changed 1 package, and audited 1856 packages in 11s
250 packages are looking for funding
  run `npm fund` for details

24 vulnerabilities (7 low, 13 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.
```

5. Fase 4: Personalización y Extensión de Pruebas

Modificación del archivo json con el nombre de mi repo

Se utilizó la herramienta jq para modificar el archivo package.json y alinear los metadatos con el repositorio del grupo:

- name: "auy1102-001v-2025-g5"
- repository.url: "<https://github.com/bapp86/AUY1102-001V-2025-G5.git>"
- author: "bapp86 - AUY1102-001V-2025-G5"

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ jq ' .name = "auy1102-001v-2025-g5" | .repository.url = "https://github.com/bapp86/AUY1102-001V-2025-G5.git" | .author = "bapp86 - AUY1102-001V-2025-G5" ' package.json > package.tmp && mv package.tmp package.json
```

Tras validar la sintaxis del JSON, los cambios fueron confirmados (commit) y enviados al remoto group.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat package.json | grep -E '"name"|"repository"|"author"'
"name": "auy1102-001v-2025-g5",
"repository": {
"author": "bapp86 - AUY1102-001V-2025-G5",
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ jq empty package.json && echo "✓ package.json válido"
✓ package.json válido
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git add package.json
git commit -m "chore(package): update name, repository and author to reflect AUY 1102-001V-2025-G5"
[master 7b739e6] chore(package): update name, repository and author to reflect A UY1102-001V-2025-G5
 1 file changed, 29 insertions(+), 5 deletions(-)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git push group HEAD
Enumerando objetos: 5, listo.
Contando objetos: 100% (5/5), listo.
Compresión delta usando hasta 4 hilos
Comprimiendo objetos: 100% (3/3), listo.
Escribiendo objetos: 100% (3/3), 676 bytes | 676.00 KiB/s, listo.
Total 3 (delta 2), reusados 0 (delta 0), pack-reusados 0
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To https://github.com/bapp86/AUY1102-001V-2025-G5.git
 814a615..7b739e6 HEAD -> master
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

```

{} package.json M X  TS equalsTo.test.ts  TS isDifferentThan.test.ts U
() package.json > () directories
1  {
2    "name": "auy1102-001v-2025-g5",
3    "repository": {
4      "type": "git",
5      "url": "https://github.com/bapp86/AUY1102-001V-2025-G5.git"
6    },
7    "version": "1.0.0",
8    "description": "AUY1102",
9    "publishConfig": {
10      "registry": "https://npm.pkg.github.com/"
11    },
12    "license": "MIT",
13    "main": "dist/index.js",
14    "typings": "dist/index.d.ts",
15    "files": [

```

5.2. Adición de Nueva Prueba Unitaria

Se agregó un nuevo archivo de prueba: test/value-object/primitives/NumberValueObject/isDifferentThan.test.ts. Al volver a ejecutar las pruebas (npm run test:unit), el resultado fue exitoso, aumentando el conteo a **11 suites de pruebas y 22 tests** pasados.

```

bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npm run test:unit
> @Fundacion-Instituto-Profesional-Duoc-UC/auy1102-pipeline@1.0.0 test:unit
> jest --passWithNoTests

PASS  pkg-value-object | test/value-object/primitives/StringValueObject/differentTo.test.ts
PASS  pkg-value-object | test/value-object/primitives/StringValueObject/hasMoreCharacterThan.test.ts

● Cannot log after tests are done. Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}".

  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}.
  at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
  at src/index.ts:20:150

● Cannot log after tests are done. Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com

```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

```

    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
      errno: -3008,
      code: 'ENOTFOUND',
      syscall: 'getaddrinfo',
      hostname: 'api.example.com'
    }
  }".

```



```

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}".
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150

```

PASS	pkg-value-object	test/value-object/primitives/NumberValueObject/isSmallerThan.test.ts
PASS	pkg-value-object	test/value-object/primitives/NumberValueObject/isBiggerThan.test.ts
PASS	pkg-value-object	test/value-object/primitives/StringValueObject>equalsTo.test.ts

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}".

```
bpainemilla@bpainemillavm001: ~/projects/auy1102/AUY1102-Pipeline
```

```
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}".
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150
```

PASS	pkg-value-object	test/value-object/primitives/NumberValueObject>equalsTo.test.ts
PASS	pkg-value-object	test/value-object/primitives/StringValueObject/isEmpty.test.ts

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}".
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
 [cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150

```

bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

PASS pkg-value-object | test/value-object/primitives/EnumValueObject/**checkValueIsValid.test.ts**
 PASS pkg-value-object | test/value-object/primitives/StringValueObject/**hasLessCharacterThan.test.ts**

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
 Attempted to log "Error: TypeError: fetch failed
 at node:internal/deps/undici/undici:13510:13
 at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
 }".

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
 [cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}".
 at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
 at src/index.ts:20:150

PASS pkg-value-object | test/value-object/primitives/StringValueObject/**toString.test.ts**

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
 Attempted to log "Error: TypeError: fetch failed
 at node:internal/deps/undici/undici:13510:13
 at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',

```
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}".
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150
```

```
Test Suites: 10 passed, 10 total  
Tests:       18 passed, 18 total  
S snapshots: 0 total  
Time:        4.331 s  
Ran all test suites.
```

se agrega un nuevo archivo

```

bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npm run test:unit
> @Fundacion-Instituto-Profesional-Duoc-UC/auy1102-pipeline@1.0.0 test:unit
> jest --passWithNoTests

PASS  pkg-value-object  test/value-object/primitives/NumberValueObject/isSmallerThan.test.ts
PASS  pkg-value-object  test/value-object/primitives/NumberValueObject/isBiggerThan.test.ts
PASS  pkg-value-object  test/value-object/primitives/NumberValueObject/isDifferentThan.test.ts
PASS  pkg-value-object  test/value-object/primitives/StringValueObject/differentTo.test.ts
PASS  pkg-value-object  test/value-object/primitives/StringValueObject/hasMoreCharacterThan.test.ts

● Cannot log after tests are done. Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
      errno: -3008,
      code: 'ENOTFOUND',
      syscall: 'getaddrinfo',
      hostname: 'api.example.com'
    }
}".

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}".
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150

PASS  pkg-value-object  test/value-object/primitives/StringValueObject/isEmpty.test.ts

● Cannot log after tests are done. Did you forget to wait for something async in your test?

```



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

```
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
      errno: -3008,
      code: 'ENOTFOUND',
      syscall: 'getaddrinfo',
      hostname: 'api.example.com'
    }
}".

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}".
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150
```

PASS `pkg-value-object` | test/value-object/primitives/NumberValueObject>equalsTo.test.ts

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
 at node:internal/deps/undici/undici:13510:13
 at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}".

```
bpainemilla@bpainemillavm001: ~/projects/auy1102/AUY1102-Pipeline
```

```
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150
```

PASS `pkg-value-object` test/value-object/primitives/StringValueObject/**toString.test.ts**

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}."

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
 [cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

PASS pkg-value-object | test/value-object/primitives/EnumValueObject/**checkValueIsValid.test.ts**
PASS pkg-value-object | test/value-object/primitives/StringValueObject/**equalsTo.test.ts**

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}".

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
}
}
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150

PASS pkg-value-object | test/value-object/primitives/StringValueObject/**hasLessCharacterThan.test.ts**

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',

PASS | pkg-value-object | test/value-object/primitives/StringValueObject/hasLessCharacterThan.test.ts

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?

```
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}".
```

```
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}".
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:20:150
```

```
Test Suites: 11 passed, 11 total
Tests:       22 passed, 22 total
Snapshots:   0 total
Time:        3.869 s, estimated 4 s
Ran all test suites.
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ █
```

6. Fase 5: Implementación de Linting (ESLint)

6.1. Instalación y Configuración

Se instaló ESLint como dependencia de desarrollo (npm install eslint --save-dev) y se inicializó un nuevo archivo de configuración (npx eslint --init). Se seleccionó una configuración para: JavaScript, módulos ESM, React, TypeScript, y ejecución en navegador

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline $ npm install eslint --save --dev
npm warn config dev Please use --include=dev instead.
npm warn deprecated @humanwhocodes/object-schema@2.0.3: Use @eslint/object-schema instead
npm warn deprecated @humanwhocodes/config-array@0.13.0: Use @eslint/config-array instead
npm warn deprecated eslint@8.57.1: This version is no longer supported. Please see https://eslint.org
/version-support for other options.

added 6 packages, removed 4 packages, changed 12 packages, and audited 1858 packages in 8s

252 packages are looking for funding
  run `npm fund` for details

24 vulnerabilities (7 low, 13 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.

bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline $ npx eslint --init
You can also run this command directly using 'npm init @eslint/config'.

> @Fundacion-Instituto-Profesional-Duoc-UC/auy1102-pipeline@1.0.0 npx
> create-config

@eslint/create-config: v1.11.0

✓ What do you want to lint? · javascript
✓ How would you like to use ESLint? · syntax
✓ What type of modules does your project use? · esm
✓ Which framework does your project use? · react
✓ Does your project use TypeScript? · No / Yes
✓ Where does your code run? · browser
✓ Which language do you want your configuration file be written in? · js
! The config that you've selected requires the following dependencies:

eslint, globals, typescript-eslint, eslint-plugin-react
✓ Would you like to install them now? · No / Yes
✓ Which package manager do you want to use? · npm
Installing...

added 61 packages, changed 53 packages, and audited 1919 packages in 29s

286 packages are looking for funding
  run `npm fund` for details

24 vulnerabilities (7 low, 13 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.
* A config file was generated, but the config file itself may not follow your linting rules.
```

6.2. Análisis de Calidad de Código y Problemas Detectados

Tras confirmar los cambios (git commit -m "Los cambios fueron realizados con éxito") , se ejecutó el linter (npx eslint .).

- **Resultado:** Se reportaron **117 problemas (115 errores, 2 advertencias)**.
- **Problemas Principales:** Incluían errores de formato (prettier/prettier), convenciones de nombrado de archivos (unicorn/filename-case) e importación de mocks (jest/no-mocks-import).

Anterior a esto se modificó los archivos de .eslintrc.json, package-lock.json, package.json, index.ts y tsconfig.eslint.json para el correcto funcionamiento de eslint

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git add .
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git commit -m
"Los cambios fueron realizados con éxito"
[master db04775] Los cambios fueron realizados con éxito
 6 files changed, 3907 insertions(+), 794 deletions(-)
create mode 100644 eslint.config.mjs
create mode 100644 test/value-object/primitives/NumberValueObject/isDifferentTh
an.test.ts
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npx eslint .
=====

WARNING: You are currently running a version of TypeScript which is not officially supported by @typescript-eslint/typescript-estree.

You may find that it works just fine, or you may not.

SUPPORTED TYPESCRIPT VERSIONS: >=3.3.1 <4.9.0

YOUR TYPESCRIPT VERSION: 4.9.5

Please only submit bug reports when using the officially supported version.

=====
/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/src/index.ts
 4:7  warning  'githubToken' is assigned a value but never used  @typescript-eslint/no-unused-vars
 13:13 error    Insert `↵`                                prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/mother-object/IntegerMother.ts
 1:1  error    Filename is not in kebab case. Rename it to `integer-mother.ts` unicorn/filename-case
 3:8  error    Use an object instead of a class with only static members unicorn/no-static-only-class
 4:17 warning  'max' is defined but never used
@typescript-eslint/no-unused-vars

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/mother-object/MotherCreator.ts
 1:1  error    Filename is not in kebab case. Rename it to `mother-creator.ts`
```



```
unicorn/filename-case
1:1 error '@faker-js/faker' should be listed in the project's dependencies,
not devDependencies import/no-extraneous-dependencies
3:8 error Use an object instead of a class with only static members
          unicorn/no-static-only-class

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/mother-object/WordMother.ts
1:1 error Filename is not in kebab case. Rename it to `word-mother.ts` unicorn/filename-case
3:8 error Use an object instead of a class with only static members      unicorn/no-static-only-class

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/EnumValueObject/_mocks_Seasons.ts
1:1 error Filename is not in kebab case. Rename it to `seasons.ts` unicorn/filename-case
7:20 error Insert `,`                                              prettier/prettier
19:1 error Delete `↵`                                              prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/EnumValueObject/checkValueIsValid.test.ts
1:1 error Filename is not in kebab case. Rename it to `check-value-is-valid.test.ts` unicorn/filename-case
1:1 error Mocks should not be manually imported from a __mocks__ directory
. Instead use `jest.mock` and import from the original module path      jest/no-mock-s-import
1:55 error Replace `↵` with `;`                                         prettier/prettier
9:47 error Insert `;`
```

```
bpainemilla@bpainemillavm001: ~/projects/auy1102/AUY1102-Pipeline
```

```
ttier
```

```
10:7  error  Insert `;`
```

```
ttier
```

```
11:5  error  Insert `;`
```

```
ttier
```

```
12:3  error  Replace `..` with `;` ↵
```

```
ttier
```

```
/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/NumberValueObject/_mocks_/Age.ts
```

```
1:1  error  Filename is not in kebab case. Rename it to `age.ts`  unicorn/file name-case
```

```
7:2  error  Insert `↵`
```

```
ttier
```

```
/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/NumberValueObject>equalsTo.test.ts
```

```
1:1  error  Filename is not in kebab case. Rename it to `equals-to.test.ts`  unicorn/file name-case
```

```
2:1  error  Mocks should not be manually imported from a __mocks__ directory . Instead use `jest.mock` and import from the original module path  jest/no-mock s-import
```

```
8:33 error  Insert `;`
```

```
ttier
```

```
9:5  error  Insert `;`
```

```
ttier
```

```
14:35 error  Insert `;`
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

```
ttier
  18:7  error  Insert `;`
```

```
ttier
  22:59 error  Insert `;`
```

```
ttier
  26:7  error  Insert `;`
```

```
ttier
  27:5  error  Insert `;`
```

```
ttier
  28:3  error  Insert `;`
```

```
ttier
```

```
/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives
/NumberValueObject/isBiggerThan.test.ts
  1:1  error  Filename is not in kebab case. Rename it to `is-bigger-than.test
.ts`
```

```
name-case
  2:1  error  Mocks should not be manually imported from a __mocks__ directory
. Instead use `jest.mock` and import from the original module path  jest/no-mock
s-import
  8:12 error  Insert `;`
```

```
ttier
  9:5  error  Insert `;`
```

```
ttier
  14:38 error  Insert `;`
```

```
bpainemilla@bpainemillavm001: ~/projects/auy1102/AUY1102-Pipeline
```

```
ttier
18:7  error  Insert `;`                                prettier/pre
ttier
22:37 error  Insert `;`                               prettier/pre
ttier
26:7  error  Insert `;`                                prettier/pre
ttier
27:5  error  Insert `;`                                prettier/pre
ttier
28:3  error  Insert `;`                                prettier/pre
ttier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives
/NumberValueObject/isDifferentThan.test.ts
  1:1  error  Filename is not in kebab case. Rename it to 'is-different-than.te
```

unicorn/file

```
st.ts`  
ame-case
  2:1  error  Mocks should not be manually imported from a __mocks__ directory.  
Instead use 'jest.mock' and import from the original module path  jest/no-mocks  
-import
  46:4 error  Insert `⇒`                                prettier/pre
tier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives
/NumberValueObject/isSmallerThan.test.ts
  1:1  error  Filename is not in kebab case. Rename it to 'is-smaller-than.tes
```

unicorn/file

```
t.ts`  
name-case
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

```
2:1  error  Mocks should not be manually imported from a __mocks__ directory
. Instead use `jest.mock` and import from the original module path  jest/no-mock
s-import
  8:12  error  Insert `;`                                              prettier/prettier
  9:5  error  Insert `;`                                              prettier/prettier
 14:37  error  Insert `;`                                              prettier/prettier
 18:7  error  Insert `;`                                              prettier/prettier
 22:38  error  Insert `;`                                              prettier/prettier
 26:7  error  Insert `;`                                              prettier/prettier
 27:5  error  Insert `;`                                              prettier/prettier
 28:3  error  Insert `;`                                              prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives
/StringValueObject/_mocks_/FirstName.ts
 1:1  error  Filename is not in kebab case. Rename it to `first-name.ts`  unicor
n/filename-case

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

/StringValueObject/differentTo.test.ts

1:1 error Filename is not in kebab case. Rename it to 'different-to.test.ts' unicorn/file-name-case

2:1 error Mocks should not be manually imported from a __mocks__ directory. Instead use 'jest.mock' and import from the original module path jest/no-mocks-import

2:103 error Insert `;` prettier/prettier

9:31 error Insert `;` prettier/prettier

10:5 error Insert `;` prettier/prettier

14:53 error Insert `;` prettier/prettier

18:7 error Insert `;` prettier/prettier

21:38 error Insert `;` prettier/prettier

25:7 error Insert `;` prettier/prettier

26:5 error Insert `;` prettier/prettier

27:3 error Insert `;` prettier/prettier

ettier

```
bpainemilla@bpainemillavm001:~/projects/auy1102/...          Q  ⓧ  -  ⓧ  x
/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/StringValueObject>equalsTo.test.ts
  1:1  error  Filename is not in kebab case. Rename it to 'equals-to.test.ts'          unicorn/filename-case
  1:1  error  Mocks should not be manually imported from a __mocks__ directory. Instead use 'jest.mock' and import from the original module path  jest/no-mocks-import
  1:103 error  Insert ';'          prettier/prettier
  8:31  error  Insert ';'          prettier/prettier
  9:5   error  Insert ';'          prettier/prettier
 13:44 error  Insert ';'          prettier/prettier
 17:7   error  Insert ';'          prettier/prettier
 20:59 error  Insert ';'          prettier/prettier
 24:7   error  Insert ';'          prettier/prettier
 25:5   error  Insert ';'          prettier/prettier
 26:3   error  Insert ';'          prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/StringValueObject/hasLessCharacterThan.test.ts
  1:1  error  Filename is not in kebab case. Rename it to 'has-less-character-than.test.ts'          unicorn/filename-case
  1:1  error  Mocks should not be manually imported from a __mocks__ directory. Instead use 'jest.mock' and import from the original module path  jest/no-mocks-import
  1:103 error  Insert ';'          prettier/prettier
  9:5   error  Insert ';'          prettier/prettier
 13:58 error  Insert ';'          prettier/prettier
 16:7   error  Insert ';'          prettier/prettier
```



```
bpainemilla@bpainemillavm001: ~/projects/auy1102/... prettier/prettier
19:56 error Insert `;` prettier/prettier
22:7  error Insert `;` prettier/prettier
23:5  error Insert `;` prettier/prettier
24:3  error Insert `;` prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/StringValueObject/hasMoreCharacterThan.test.ts
 1:1  error  Filename is not in kebab case. Rename it to 'has-more-character-than.test.ts' unicorn/filename-case
       1:1  error  Mocks should not be manually imported from a __mocks__ directory. Instead use 'jest.mock' and import from the original module path jest/no-mocks-import
       1:95 error Insert `;` prettier/prettier
      9:5  error Insert `;` prettier/prettier
     13:57 error Insert `;` prettier/prettier
     16:7  error Insert `;` prettier/prettier
     19:56 error Insert `;` prettier/prettier
     22:7  error Insert `;` prettier/prettier
     23:5  error Insert `;` prettier/prettier
     24:3  error Insert `;` prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/StringValueObject/isEmpty.test.ts
 1:1  error  Filename is not in kebab case. Rename it to 'is-empty.test.ts' unicorn/filename-case
       1:1  error  Mocks should not be manually imported from a __mocks__ directory. Instead use 'jest.mock' and import from the original module path jest/no-mocks-import
```

```
24:3  error  Insert `;`                                prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/StringValueObject/isEmpty.test.ts
  1:1  error  Filename is not in kebab case. Rename it to 'is-empty.test.ts'      unicorn/filename-case
    1:1  error  Mocks should not be manually imported from a __mocks__ directory. Instead use 'jest.mock' and import from the original module path  jest/no-mocks-import
      1:95  error  Insert `;`                                prettier/prettier
      7:60  error  Insert `;`                                prettier/prettier
      8:43  error  Insert `;`                                prettier/prettier
      11:7  error  Insert `;`                               prettier/prettier
      14:59  error  Insert `;`                               prettier/prettier
      15:43  error  Insert `;`                               prettier/prettier
      18:7  error  Insert `;`                               prettier/prettier
      19:5  error  Insert `;`                               prettier/prettier
      20:3  error  Insert `;`                               prettier/prettier

/home/bpainemilla/projects/auy1102/AUY1102-Pipeline/test/value-object/primitives/StringValueObject/toString.test.ts
  1:1  error  Filename is not in kebab case. Rename it to 'to-string.test.ts'      unicorn/filename-case
    1:1  error  Mocks should not be manually imported from a __mocks__ directory. Instead use 'jest.mock' and import from the original module path  jest/no-mocks-import
      1:95  error  Insert `;`                                prettier/prettier
      9:31  error  Insert `;`                                prettier/prettier
      18:7  error  Insert `;`                               prettier/prettier
      19:5  error  Insert `;`                               prettier/prettier
      20:3  error  Insert `;`                               prettier/prettier

✖ 117 problems (115 errors, 2 warnings)
  86 errors and 0 warnings potentially fixable with the '--fix` option.
```

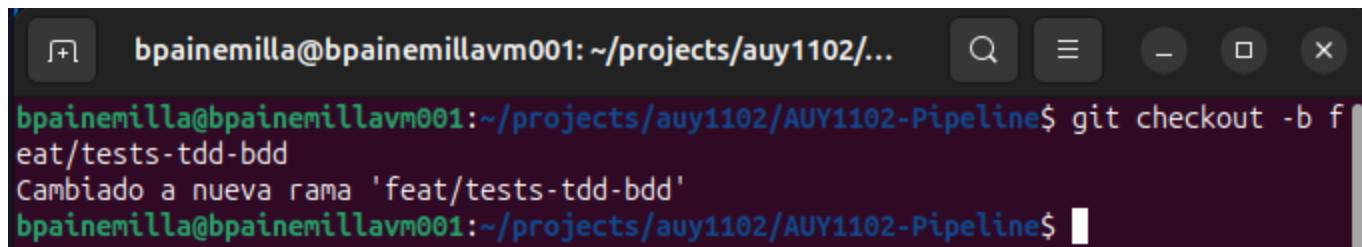
7. Fase 6: Implementación de TDD y BDD

7.1. Creación de Rama de Funcionalidad (Feature Branch)

Para implementar las nuevas metodologías de prueba, se creó una nueva rama llamada feat/tests-tdd-bdd.

Se creó un ejemplo mínimo de TDD:

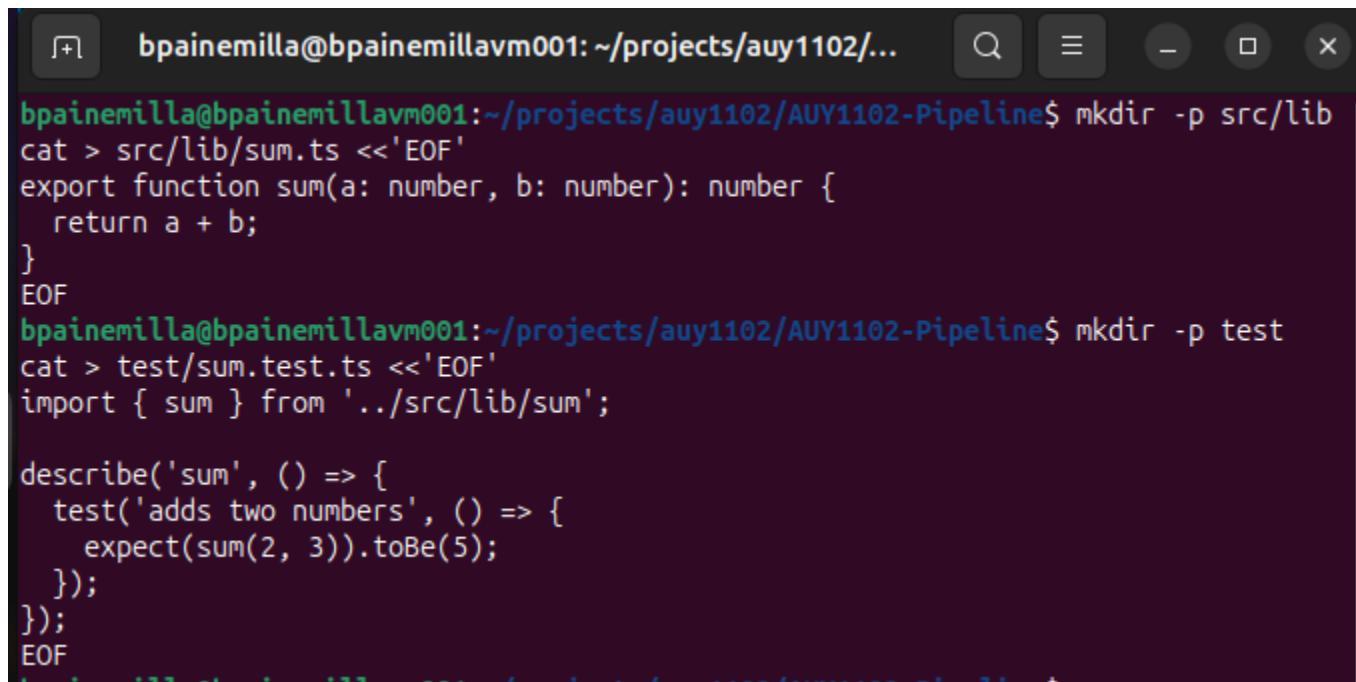
1. Se creó un archivo de prueba test/sum.test.ts que importaba una función sum (aún inexistente) y esperaba que sum(2, 3) fuese 5.



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git checkout -b feat/tests-tdd-bdd
Cambiado a nueva rama 'feat/tests-tdd-bdd'
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

A screenshot of a terminal window showing the command `git checkout -b feat/tests-tdd-bdd` being run. The output shows the user has switched to a new branch named 'feat/tests-tdd-bdd'.

2. Se creó el archivo src/lib/sum.ts con la implementación de la función sum para satisfacer la prueba.



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ mkdir -p src/lib
cat > src/lib/sum.ts <<'EOF'
export function sum(a: number, b: number): number {
    return a + b;
}
EOF
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ mkdir -p test
cat > test/sum.test.ts <<'EOF'
import { sum } from '../src/lib/sum';

describe('sum', () => {
    test('adds two numbers', () => {
        expect(sum(2, 3)).toBe(5);
    });
});
EOF
```

A screenshot of a terminal window showing the creation of directory structures and files. It includes commands like `mkdir -p`, `cat >`, and `import { sum } from '../src/lib/sum';`. The terminal also shows the creation of a test file with a describe block and a test case for the sum function.

3. Se instalaron las dependencias ts-jest y @types/jest.
4. Se ejecutó npx jest --coverage ... test/sum.test.ts, confirmando que la prueba pasó (PASS) y que src/lib/sum.ts alcanzó un 100% de cobertura de código

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npm install --save-dev @types/jest ts-jest
npx ts-jest config:init
npx jest --coverage --runTestsByPath test/sum.test.ts

added 18 packages, removed 24 packages, changed 6 packages, and audited 1913 packages in 15s

287 packages are looking for funding
  run `npm fund` for details

24 vulnerabilities (7 low, 13 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.
ts-jest[cli] (FATAL) Configuration file jest.config.js already exists.
PASS  pkg-value-object test/sum.test.ts
  SUM
    ✓ adds two numbers (2 ms)

-----|-----|-----|-----|-----|-----|
File      | % Stmt | % Branch | % Funcs | % Lines | Uncovered Line #
-----|-----|-----|-----|-----|-----|
All files | 3.07  | 0         | 3.44    | 3.07    | 
src       | 0       | 100       | 0        | 0        | 
index.ts  | 0       | 100       | 0        | 0        | 3-13
src/lib   | 100    | 100       | 100     | 100     | 
sum.ts    | 100    | 100       | 100     | 100     | 
src/quality | 0       | 100       | 0        | 0        | 
errores-object.ts | 0       | 100       | 0        | 0        | 2-6
...cure-1-object.ts | 0       | 100       | 0        | 0        | 1-27
...cure-2-object.ts | 0       | 100       | 0        | 0        | 1-32
...object/primitives | 0       | 0         | 0        | 0        | 
...-value-object.ts | 0       | 0         | 0        | 0        | 7-35
...-value-object.ts | 0       | 0         | 0        | 0        | 4-11
...-value-object.ts | 0       | 100       | 0        | 0        | 5-17
...-value-object.ts | 0       | 0         | 0        | 0        | 5-29
-----|-----|-----|-----|-----|-----|
Test Suites: 1 passed, 1 total
Tests:      1 passed, 1 total
Snapshots:  0 total
Time:       2.662 s
Ran all test suites within paths "test/sum.test.ts".
```

7.3. Implementación de BDD (Behavior-Driven Development)

Se implementó un ejemplo de BDD usando Cucumber:

1. Se instalaron @cucumber/cucumber, ts-node y typescript.
2. Se creó un archivo de definiciones de pasos (test/steps/sum.steps.ts) con la lógica (glue code) para las sentencias Given, When y Then.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npm install --save-dev @cucumber/cucumber
ts-node typescript
mkdir -p test/features test/steps
cat > test/features/sum.feature <<'EOF'
Feature: Sum numbers
  Scenario: Sum two positive numbers
    Given a = 2
    And b = 3
    When I sum them
    Then the result should be 5
EOF

added 89 packages, changed 1 package, and audited 2002 packages in 16s

298 packages are looking for funding
  run `npm fund` for details

24 vulnerabilities (7 low, 13 moderate, 4 high)

To address issues that do not require attention, run:
  npm audit fix

To address all issues (including breaking changes), run:
  npm audit fix --force

Run `npm audit` for details.
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

3. Se creó un archivo de definiciones de pasos (test/steps/sum.steps.ts) con la lógica (glue code) para las sentencias Given, When y Then.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat > test/steps/sum.steps.ts <<'EOF'
import { Given, When, Then } from '@cucumber/cucumber';
import assert from 'assert';
let a: number, b: number, result: number;

Given('a = {int}', function(x: number) { a = x; });
Given('b = {int}', function(x: number) { b = x; });
When('I sum them', function() { result = a + b; });
Then('the result should be {int}', function(expected: number) { assert.strictEqual(result, expected); });
EOF
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

4. Al ejecutar las pruebas BDD, el resultado fue 1 scenario (1 undefined), 4 steps (4 undefined), indicando que los pasos estaban definidos pero no correctamente implementados o enlazados en la configuración de ejecución.y Then.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat > test/steps/sum.steps.ts <<'EOF'
import { Given, When, Then } from '@cucumber/cucumber';
import assert from 'assert';
let a: number, b: number, result: number;

Given('a = {int}', function(x: number) { a = x; });
Given('b = {int}', function(x: number) { b = x; });
When('I sum them', function() { result = a + b; });
Then('the result should be {int}', function(expected: number) { assert.strictEqual(result, expected); });
EOF
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ node -e "let p=require('./package.json'); p.scripts=p.scripts||{}; p.scripts.bdd='cucumber-js -r ts-node/register test/features --require-module ts-node/register'; require('fs').writeFileSync('package.json', JSON.stringify(p, null,2))"
npm run bdd

> auy1102-001v-2025-g5@1.0.0 bdd
> cucumber-js -r ts-node/register test/features --require-module ts-node/register

UUUU

Failures:

1) Scenario: Sum two positive numbers # test/features/sum.feature:2
 ? Given a = 2
   Undefined. Implement with the following snippet:

     Given('a = {int}', function (int) {
       // Given('a = {float}', function (float) {
       // Write code here that turns the phrase above into concrete actions
       return 'pending';
     });

 ? And b = 3
   Undefined. Implement with the following snippet:

     Given('b = {int}', function (int) {
       // Given('b = {float}', function (float) {
       // Write code here that turns the phrase above into concrete actions
       return 'pending';
     });

 ? When I sum them
   Undefined. Implement with the following snippet:

     When('I sum them', function () {
       // Write code here that turns the phrase above into concrete actions

```

```
    return 'pending';
});
```

? Then the result should be 5

Undefined. Implement with the following snippet:

```
Then('the result should be {int}', function (int) {
// Then('the result should be {float}', function (float) {
// Write code here that turns the phrase above into concrete actions
return 'pending';
});
```

```
1 scenario (1 undefined)
4 steps (4 undefined)
0m00.002s (executing steps: 0m00.000s)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

Al ejecutar el conjunto completo de pruebas Jest (npx jest --coverage), el total de pruebas unitarias exitosas aumentó a **12 suites y 23 tests**

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ npx jest --coverage
npm run bdd
PASS  pkg-value-object/test/value-object/primitives/NumberValueObject/isDifferentThan.test.ts
PASS  pkg-value-object/test/value-object/primitives/NumberValueObject/isSmallerThan.test.ts
PASS  pkg-value-object/test/value-object/primitives/StringValueObject/differentTo.test.ts
PASS  pkg-value-object/test/value-object/primitives/NumberValueObject/isBiggerThan.test.ts
PASS  pkg-value-object/test/value-object/primitives/NumberValueObject>equalsTo.test.ts

● Cannot log after tests are done. Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
      errno: -3008,
      code: 'ENOTFOUND',
      syscall: 'getaddrinfo',
      hostname: 'api.example.com'
    }
}".

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:510:20

● Cannot log after tests are done. Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
    at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
      errno: -3008,
      code: 'ENOTFOUND',
      syscall: 'getaddrinfo',
      hostname: 'api.example.com'
```

```

bpainemilla@bpainemillavm001: ~/projects/auy1102/AUY1102-Pipeline
}

}.

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:510:20

PASS pkg-value-object test/value-object/primitives/StringValueObject/equalsTo.test.ts
PASS pkg-value-object test/value-object/primitives/StringValueObject/hasLessCharacterThan.test.ts

● Cannot log after tests are done. Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
  at node:internal/deps/undici/undici:13510:13
  at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}.

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
  errno: -3008,
  code: 'ENOTFOUND',
  syscall: 'getaddrinfo',
  hostname: 'api.example.com'
}
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:510:20

```

```
bpainemilla@bpainemillavm001: ~/projects/auy1102/AUY1102-Pipeline
```

PASS pkg-value-object test/value-object/primitives/StringValueObject/hasMoreCharacterThan.test.ts

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}".

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
}
}."
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:510:20

PASS pkg-value-object test/value-object/primitives/EnumValueObject/checkValueIsValid.test.ts
PASS pkg-value-object test/sum.test.ts
PASS pkg-value-object test/value-object/primitives/StringValueObject/isEmpty.test.ts

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}".

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

```
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
  [cause]: Error: getaddrinfo ENOTFOUND api.example.com
  at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
    errno: -3008,
    code: 'ENOTFOUND',
    syscall: 'getaddrinfo',
    hostname: 'api.example.com'
  }
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:510:20
```

PASS `pkg-value-object` test/value-object/primitives/StringValueObject/**toString.test.ts**

- **Cannot log after tests are done.** Did you forget to wait for something async in your test?
Attempted to log "Error: TypeError: fetch failed
at node:internal/deps/undici/undici:13510:13
at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
 at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
 }
}."

at processTicksAndRejections (node:internal/process/task_queues:95:5) {
[cause]: Error: getaddrinfo ENOTFOUND api.example.com
at GetAddrInfoReqWrap.onlookupall [as oncomplete] (node:dns:122:26) {
 errno: -3008,
 code: 'ENOTFOUND',
 syscall: 'getaddrinfo',
 hostname: 'api.example.com'
}
}.
at console.error (node_modules/@jest/console/build/BufferedConsole.js:127:10)
at src/index.ts:510:20

```

bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline
```

File	%Stmts	%Branch	%Funcs	%Lines	Uncovered Line #s
All files	40.78	60	54.54	40.78	
src	62.5	100	25	62.5	
index.ts	62.5	100	25	62.5	8-10
src/lib	100	100	100	100	
sum.ts	100	100	100	100	
src/quality	0	100	0	0	
errores-object.ts	0	100	0	0	2-6
insecure-1-object.ts	0	100	0	0	1-27
insecure-2-object.ts	0	100	0	0	1-32
src/value-object	100	100	100	100	
index.ts	100	100	100	100	
src/value-object/primitives	60.52	60	69.56	60.52	
date-value-object.ts	6.66	0	0	6.66	3-35
enum-value-object.ts	83.33	0	100	83.33	11
index.ts	100	100	100	100	
number-value-object.ts	100	100	100	100	
string-value-object.ts	100	100	100	100	

```

Test Suites: 12 passed, 12 total
Tests:      23 passed, 23 total
Snapshots:  0 total
Time:       7.338 s
Ran all test suites.

> auy1102-001v-2025-g5@1.0.0 bdd
> cucumber-js -r ts-node/register test/features --require-module ts-node/register

UUUU

Failures:

1) Scenario: Sum two positive numbers # test/features/sum.feature:2
 ? Given a = 2
   Undefined. Implement with the following snippet:

     Given('a = {int}', function (int) {
       // Given('a = {float}', function (float) {
       // Write code here that turns the phrase above into concrete actions
       return 'pending';
     });

 ? And b = 3

```



```
bpainemilla@bpainemillavm001: ~/projects/auy1102/AUY1102-Pipeline
```

Undefined. Implement with the following snippet:

```
Given('b = {int}', function (int) {
// Given('b = {float}', function (float) {
// Write code here that turns the phrase above into concrete actions
return 'pending';
});
```

? When I sum them

Undefined. Implement with the following snippet:

```
When('I sum them', function () {
// Write code here that turns the phrase above into concrete actions
return 'pending';
});
```

? Then the result should be 5

Undefined. Implement with the following snippet:

```
Then('the result should be {int}', function (int) {
// Then('the result should be {float}', function (float) {
// Write code here that turns the phrase above into concrete actions
return 'pending';
});
```

1 scenario (1 undefined)
4 steps (4 undefined)
0m00.005s (executing steps: 0m00.000s)

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

8. Fase 7: Configuración de Integración Continua (CI)

8.1. Creación de Workflows de GitHub Actions

Se procedió a agregar los archivos de configuración para GitHub Actions en el directorio .github/workflows/:

- **ci-tests.yml:** Para ejecución de npm ci y npm run test -- --coverage en eventos push y pull_request.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ mkdir -p .github/workflows
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat > .github/workflows/ci-tests.yml <<'EOF'
name: CI - Tests and Coverage
on:
  push:
    branches: [ main, master, develop, feat/* ]
  pull_request:
    branches: [ main, master, develop ]
jobs:
  test:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - name: Use Node
        uses: actions/setup-node@v4
        with:
          node-version: '18'
      - name: Install dependencies
        run: npm ci
      - name: Run tests and coverage
        run: npm run test -- --coverage
      - name: Upload coverage artifact
        uses: actions/upload-artifact@v4
        with:
          name: coverage-report
          path: coverage
EOF
```

- **codeql-analysis.yml:** Para análisis estático de seguridad con CodeQL.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat > .github/workflows/codeql-analysis.yml <<'EOF'
name: CodeQL
on:
  push:
    branches: [ main, master, develop ]
  pull_request:
    branches: [ main, master, develop ]
jobs:
  analyze:
    name: Analyze
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - name: Initialize CodeQL
        uses: github/codeql-action/init@v2
        with:
          languages: javascript, typescript
      - name: Autobuild
        uses: github/codeql-action/autobuild@v2
      - name: Perform CodeQL Analysis
        uses: github/codeql-action/analyze@v2
EOF
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

- **dependabot.yml:** Para la actualización automática de dependencias (npm, diario).

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat > .github/dependabot.yml <<'EOF'
version: 2
updates:
- package-ecosystem: "npm"
  directory: "/"
  schedule:
    interval: "daily"
  open-pull-requests-limit: 10
EOF
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

- **snyk-scan.yml:** Para el escaneo de vulnerabilidades usando Snyk.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat > .github/workflows/snyk-scan.yml <<'EOF'
name: Snyk Scan
on:
  push:
    branches: [ main, master, develop ]
  pull_request:
    branches: [ main, master, develop ]
jobs:
  snyk:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - name: Setup Node
        uses: actions/setup-node@v4
        with:
          node-version: '18'
      - name: Install deps
        run: npm ci
      - name: Run Snyk test
        uses: snyk/actions/node@master
        with:
          args: test --all-projects --severity-threshold=low
        env:
          SNYK_TOKEN: ${[ secrets.SNYK_TOKEN ]}
```

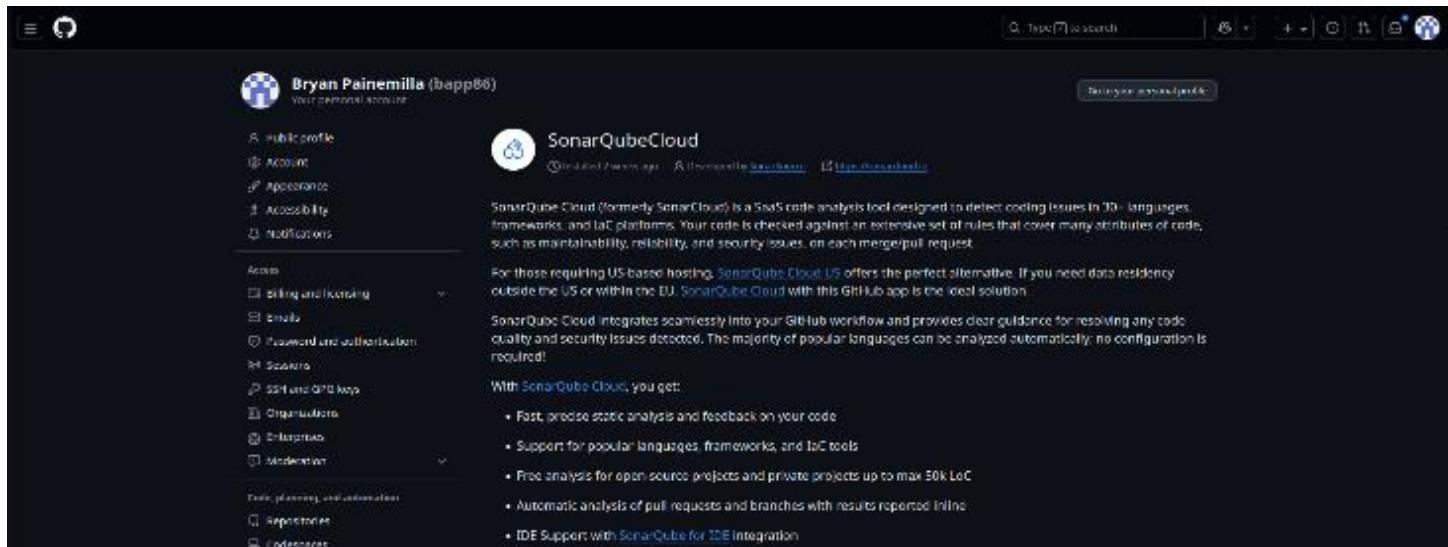
Todos estos cambios, junto con los ejemplos TDD/BDD, se confirmaron y subieron a la rama feat/tests-tdd-bdd

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git add .github test src package.json package-lock.json
git commit -m "ci(workflows): add CI tests, CodeQL, Dependabot and Snyk workflows; add TDD/BDD examples"
git push group feat/tests-tdd-bdd
[feat/tests-tdd-bdd 16dd9e4] ci(workflows): add CI tests, CodeQL, Dependabot and Snyk workflows; add TDD/BDD examples
10 files changed, 2530 insertions(+), 524 deletions(-)
create mode 100644 .github/workflows/ci-tests.yml
create mode 100644 .github/workflows/codeql-analysis.yml
create mode 100644 .github/workflows/snyk-scan.yml
create mode 100644 src/lib/sum.ts
create mode 100644 test/features/sum.feature
create mode 100644 test/steps/sum.steps.ts
create mode 100644 test/sum.test.ts
Enumerando objetos: 46, listo.
Contando objetos: 100% (46/46), listo.
Compresión delta usando hasta 4 hilos
Comprimiendo objetos: 100% (28/28), listo.
Escribiendo objetos: 100% (32/32), 73.52 KiB | 1.84 MiB/s, listo.
Total 32 (delta 11), reusados 0 (delta 0), pack-reusados 0
remote: Resolving deltas: 100% (11/11), completed with 7 local objects.
remote:
remote: Create a pull request for 'feat/tests-tdd-bdd' on GitHub by visiting:
remote:     https://github.com/bapp86/AUY1102-001V-2025-G5/pull/new/feat/tests-tdd-bdd
remote:
To https://github.com/bapp86/AUY1102-001V-2025-G5.git
 * [new branch]      feat/tests-tdd-bdd -> feat/tests-tdd-bdd
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

8.2. Configuración de Secrets (SonarCloud y Snyk)

Se configuraron los secrets necesarios en el repositorio de GitHub:

- Se instaló la aplicación SonarQubeCloud (SonarCloud) y se le dio acceso al repositorio bapp86/AUY1102-001V-2025-G5



The screenshot shows the GitHub user profile for Bryan Painemilla (bapp86). On the left, there is a sidebar with various settings like public profile, account, appearance, notifications, access, billing and licensing, emails, password and authentication, SSH keys, organizations, enterprises, and moderation. On the right, there is a card for the SonarQubeCloud application. The card has a logo, the name 'SonarQubeCloud', and a link to its GitHub repository. Below the card, there is a brief description of SonarQube Cloud, stating it is a code analysis tool designed to detect coding issues in 30+ languages, frameworks, and IoT platforms. It mentions that SonarQube Cloud integrates seamlessly into GitHub's workflow and provides clear guidance for resolving any code quality and security issues detected. The card also lists benefits such as fast, precise static analysis, support for popular languages and frameworks, free analysis for open-source projects, automatic analysis of pull requests, and IDE support.

Repository access

All repositories
This applies to all current and future repositories owned by the resource owner. Also includes public repositories (read-only).

Only select repositories
Select at least one repository. Also includes public repositories (read-only).

Select repositories ▾

Selected 1 repository.

bapp86/AUY1102-001V-2025-G5 X

Save **Cancel**

Danger zone

Suspend your installation
This will block the app access to your resources. **Suspend**

Uninstall "SonarQubeCloud"
This will remove the app and revoke access to all resources. **Uninstall**

- Se configuraron los secrets SONAR_TOKEN y SONAR_ORG usando el GitHub CLI.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline $ gh secret set SONAR_TOKEN --body "████████████████████████████████████████"
████████████████████████████████████████ -R bapp86/AUY1102-Pipeline
gh secret set SONAR_ORG --body "bapp86" -R bapp86/AUY1102-Pipeline
✓ Set Actions secret SONAR_TOKEN for bapp86/AUY1102-Pipeline
✓ Set Actions secret SONAR_ORG for bapp86/AUY1102-Pipeline
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

- Se configuraron los secrets SONAR_TOKEN y SONAR_ORG usando el GitHub CLI.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline $ gh secret set SNYK_TOKEN --body "1d09bb2a-92bb-4
5b3-9379-3e2e8cb2c36f" -R bapp86/AUY1102-Pipeline
✓ Set Actions secret SNYK_TOKEN for bapp86/AUY1102-Pipeline
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

9. Fase 8: Creación y Gestión de Pull Request (PR)

9.1. Diagnóstico y Corrección de Errores de CI

El primer intento de crear un Pull Request (gh pr create) falló. La revisión de los GitHub Actions (gh run list) mostró que el workflow "CI - Tests and Coverage" había fallado.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh repo set-default bapp86/AUY1102-Pipeline
✓ Set bapp86/AUY1102-Pipeline as the default repository for the current directory
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh pr create --base master --head bapp86:features/tests-tdd-bdd --title "Add TDD and BDD tests, CI, CodeQL, Dependabot and Snyk" --body "Incluye ejemplos TDD (Jest) y BDD (Cucumber), workflows de CI y análisis (CodeQL, snyk), y dependabot.yml."
Warning: 2 uncommitted changes

Creating pull request for bapp86:features/tests-tdd-bdd into master in bapp86/AUY1102-Pipeline

pull request create failed: GraphQL: Head sha can't be blank, Base sha can't be blank, No commits between master and features/tests-tdd-bdd, Head ref must be a branch (createPullRequest)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

El análisis del log (gh run view ... --log-failed) reveló el error: npm error Missing script: "test". El archivo package.json definía test:unit y test:coverage, pero el workflow en ci-tests.yml invocabía npm run test (sin sufijo).

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh run list


| STATUS | TITLE               | WORKFLOW      | BRANCH        | EVENT        | ID          | ELAPSED | AGE           |
|--------|---------------------|---------------|---------------|--------------|-------------|---------|---------------|
| X      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18953245918 | 28s     | about 9 da... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18919735995 | 7m31s   | about 10 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18886861038 | 7m58s   | about 11 d... |
| X      | [Snyk] Upgrade c... | Typescript... | snyk-upgra... | pull_request | 18871072329 | 53s     | about 11 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18853575051 | 7m33s   | about 12 d... |
| X      | build(deps-dev):... | Typescript... | dependabot... | pull_request | 18804673551 | 3m23s   | about 14 d... |
| X      | build(deps-dev):... | Typescript... | dependabot... | pull_request | 18804672830 | 2m44s   | about 14 d... |
| X      | build(deps-dev):... | Typescript... | dependabot... | pull_request | 18804670934 | 1m54s   | about 14 d... |
| X      | build(deps-dev):... | Typescript... | dependabot... | pull_request | 18804669659 | 1m48s   | about 14 d... |
| X      | build(deps): Bum... | Typescript... | dependabot... | pull_request | 18804668647 | 58s     | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804658257 | 8m42s   | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657937 | 7m57s   | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657867 | 1m4s    | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657676 | 1m10s   | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657511 | 1m18s   | about 14 d... |


```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh run list


| STATUS | TITLE               | WORKFLOW      | BRANCH        | EVENT        | ID          | ELAPSED | AGE           |
|--------|---------------------|---------------|---------------|--------------|-------------|---------|---------------|
| X      | Fix: Usar github... | CI - Tests... | feat/tests... | push         | 19203651615 | 36s     | less than ... |
| X      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18953245918 | 28s     | about 9 da... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18919735995 | 7m31s   | about 10 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18886861038 | 7m58s   | about 11 d... |
| X      | [Snyk] Upgrade c... | TypeScript... | snyk-upgra... | pull_request | 18871072329 | 53s     | about 11 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18853575051 | 7m33s   | about 12 d... |
| X      | build(deps-dev):... | TypeScript... | dependabot... | pull_request | 18804673551 | 3m23s   | about 14 d... |
| X      | build(deps-dev):... | TypeScript... | dependabot... | pull_request | 18804672830 | 2m44s   | about 14 d... |
| X      | build(deps-dev):... | TypeScript... | dependabot... | pull_request | 18804670934 | 1m54s   | about 14 d... |
| X      | build(deps-dev):... | TypeScript... | dependabot... | pull_request | 18804669659 | 1m48s   | about 14 d... |
| X      | build(deps): Bum... | TypeScript... | dependabot... | pull_request | 18804668647 | 58s     | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804658257 | 8m42s   | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657937 | 7m57s   | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657867 | 1m45s   | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657676 | 1m10s   | about 14 d... |
| ✓      | npm_and_yarn in ... | Dependabot... | master        | dynamic      | 18804657511 | 1m18s   | about 14 d... |


```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh run view 19203651615
X feat/tests-tdd-bdd CI - Tests and Coverage · 19203651615
Triggered via push about 2 minutes ago

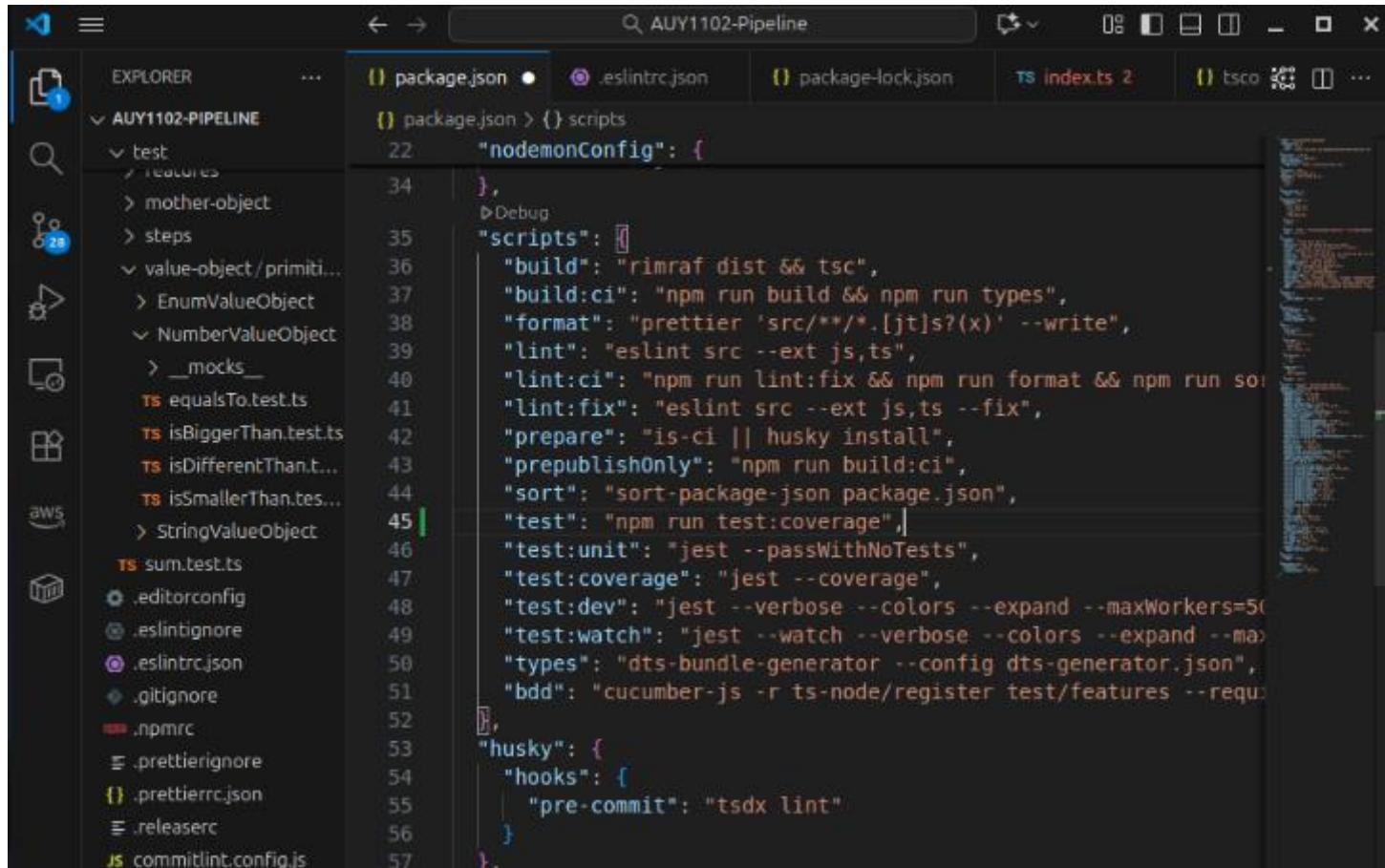
JOBS
X test in 32s (ID 54895695378)
 ✓ Set up job
 ✓ Run actions/checkout@v4
 ✓ Use Node
 ✓ Install dependencies
 X Run tests and coverage
 - Upload coverage artifact
 - Post Use Node
 ✓ Post Run actions/checkout@v4
 ✓ Complete job

ANNOTATIONS
X Process completed with exit code 1.
test: .github#10

To see what failed, try: gh run view 19203651615 --log-failed
View this run on GitHub: https://github.com/bapp86/AUY1102-Pipeline/actions/runs/19203651615
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh run view 19203651615 --log-failed
test Run tests and coverage 2025-11-09T05:00:36.4142320Z ##[group]Run npm run test -- --coverage
test Run tests and coverage 2025-11-09T05:00:36.4142648Z npm run test -- --coverage
test Run tests and coverage 2025-11-09T05:00:36.4176938Z shell: /usr/bin/bash -e {0}
test Run tests and coverage 2025-11-09T05:00:36.4177172Z ##[endgroup]
test Run tests and coverage 2025-11-09T05:00:36.5540531Z npm error Missing script: "test"
test Run tests and coverage 2025-11-09T05:00:36.5540991Z npm error
test Run tests and coverage 2025-11-09T05:00:36.5541286Z npm error To see a list of scripts, run:
test Run tests and coverage 2025-11-09T05:00:36.5541609Z npm error npm run
test Run tests and coverage 2025-11-09T05:00:36.5567499Z npm error A complete log of this run can be found in
: /home/runner/.npm/_logs/2025-11-09T05_00_36_492Z-debug-0.log
test Run tests and coverage 2025-11-09T05:00:36.5620925Z ##[error]Process completed with exit code 1.
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```


```

Se corrigió el package.json añadiendo un script test que ejecuta npm run test:coverage. Tras subir (push) la corrección, el workflow de CI se ejecutó exitosamente (marcado con "Corregir p...").

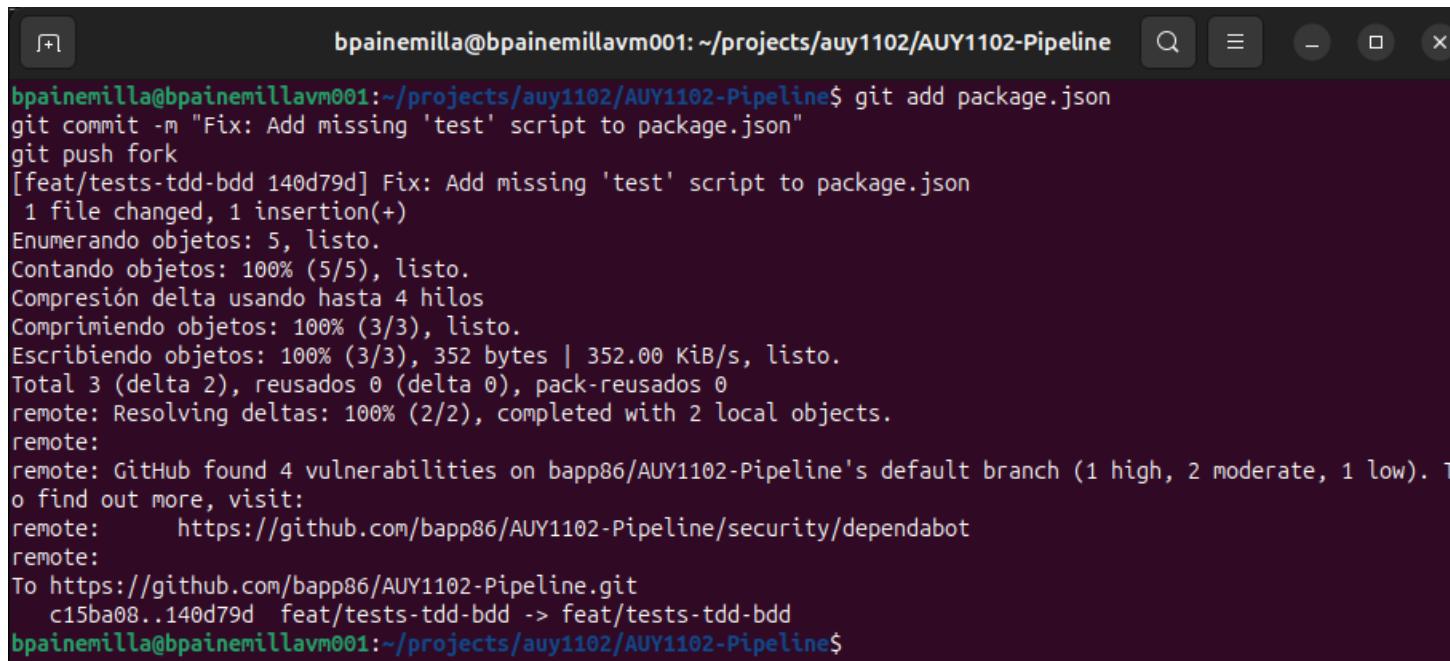


The screenshot shows the VS Code interface with the following details:

- EXPLORER:** Shows the project structure under "AUY1102-PIPELINE". It includes a "test" folder containing "features", "mother-object", "steps", "value-object/primitive", "NumberValueObject", and "StringValueObject" subfolders. Each of these subfolders contains several test files (e.g., equalsTo.test.ts, isBiggerThan.test.ts, isDifferentThan.ts, isSmallerThan.ts).
- PACKAGE.JSON:** The main package.json file is open in the editor. A cursor is on line 45, which contains the closing brace of the "scripts" object. The "scripts" object defines various build and test commands.

```

{
  "scripts": [
    "build": "rimraf dist && tsc",
    "build:ci": "npm run build && npm run types",
    "format": "prettier 'src/**/*.{jt}sx?(x)' --write",
    "lint": "eslint src --ext js,ts",
    "lint:ci": "npm run lint:fix && npm run format && npm run sonar",
    "lint:fix": "eslint src --ext js,ts --fix",
    "prepare": "is-ci || husky install",
    "prepublishOnly": "npm run build:ci",
    "sort": "sort-package-json package.json",
    "test": "npm run test:coverage",
    "test:unit": "jest --passWithNoTests",
    "test:coverage": "jest --coverage",
    "test:dev": "jest --verbose --colors --expand --maxWorkers=5",
    "test:watch": "jest --watch --verbose --colors --expand --maxWorkers=5",
    "types": "dts-bundle-generator --config dts-generator.json",
    "bdd": "cucumber-javascript -r ts-node/register test/features --require"
  ],
  "husky": {
    "hooks": {
      "pre-commit": "tsdx lint"
    }
  }
}
  
```



The terminal window shows the following command sequence:

```

bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git add package.json
git commit -m "Fix: Add missing 'test' script to package.json"
git push fork
[feat/tests-tdd-bdd 140d79d] Fix: Add missing 'test' script to package.json
  1 file changed, 1 insertion(+)
  Enumerando objetos: 5, listo.
  Contando objetos: 100% (5/5), listo.
  Compresión delta usando hasta 4 hilos
  Comprimiendo objetos: 100% (3/3), listo.
  Escribiendo objetos: 100% (3/3), 352 bytes | 352.00 KiB/s, listo.
  Total 3 (delta 2), reusados 0 (delta 0), pack-reusados 0
  remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
  remote:
  remote: GitHub found 4 vulnerabilities on bapp86/AUY1102-Pipeline's default branch (1 high, 2 moderate, 1 low). To find out more, visit:
  remote:     https://github.com/bapp86/AUY1102-Pipeline/security/dependabot
  remote:
  To https://github.com/bapp86/AUY1102-Pipeline.git
    c15ba08..140d79d  feat/tests-tdd-bdd -> feat/tests-tdd-bdd
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ 
  
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh run view 19203883901 --log-failed
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh run list


| STATUS | TITLE              | WORKFLOW        | BRANCH          | EVENT        | ID           | ELAPSED | AGE             |
|--------|--------------------|-----------------|-----------------|--------------|--------------|---------|-----------------|
| ✓      | Fix: Corregir p... | CI - Tests a... | feat/tests-t... | push         | 19203883901  | 40s     | about 1 min...  |
| ✗      | Fix: Corregir e... | CI - Tests a... | feat/tests-t... | push         | 19203778381  | 37s     | about 11 min... |
| ✗      | Fix: Add missin... | CI - Tests a... | feat/tests-t... | push         | 19203740353  | 38s     | about 14 min... |
| ✗      | Fix: Usar githu... | CI - Tests a... | feat/tests-t... | push         | 19203651615  | 36s     | about 22 min... |
| ✗      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18953245918  | 28s     | about 9 days... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18919735995  | 7m31s   | about 10 day... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 188866861038 | 7m58s   | about 11 day... |
| ✗      | [Snyk] Upgrade ... | TypeScript f... | snyk-upgrade... | pull_request | 18871072329  | 53s     | about 11 day... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18853575051  | 7m33s   | about 12 day... |
| ✗      | build(deps-dev)... | TypeScript f... | dependabot/n... | pull_request | 18804673551  | 3m23s   | about 14 day... |
| ✗      | build(deps-dev)... | TypeScript f... | dependabot/n... | pull_request | 18804672830  | 2m44s   | about 14 day... |
| ✗      | build(deps-dev)... | TypeScript f... | dependabot/n... | pull_request | 18804670934  | 1m54s   | about 14 day... |
| ✗      | build(deps-dev)... | TypeScript f... | dependabot/n... | pull_request | 18804669659  | 1m48s   | about 14 day... |
| ✗      | build(deps): Bu... | TypeScript f... | dependabot/n... | pull_request | 18804668647  | 58s     | about 14 day... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18804658257  | 8m42s   | about 14 day... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18804657937  | 7m57s   | about 14 day... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18804657867  | 1m4s    | about 14 day... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18804657676  | 1m10s   | about 14 day... |
| ✓      | npm_and_yarn in... | Dependabot U... | master          | dynamic      | 18804657511  | 1m18s   | about 14 day... |



```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh run view 19203883901 --log-failed
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh pr merge
```


```

9.2. Creación de Pull Request

Un segundo intento de PR (gh pr create) falló nuevamente. Se determinó que el repositorio de destino era incorrecto. El comando final exitoso apuntó al repositorio de la fundación:

```
gh pr create --repo Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline --base master
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh pr create --base master --head features/test-s-tdd-bdd

Creating pull request for features/tests-tdd-bdd into master in bapp86/AUY1102-Pipeline

? Title Add TDD and BDD tests, CI, CodeQL, Dependabot and Snyk
? Choose a template Open a blank pull request
? Body <Received>
? What's next? Submit

✗ operation failed. To restore: gh pr create --recover /tmp/gh1598191522.json

pull request create failed: GraphQL: Head sha can't be blank, Base sha can't be blank, No commits between master and features/tests-tdd-bdd, Head ref must be a branch (createPullRequest)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh pr create --repo Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline --base master

Creating pull request for bapp86:feat/tests-tdd-bdd into master in Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline

? Title Add TDD and BDD tests...
? Choose a template Open a blank pull request
? Body <Received>
? What's next? Submit
https://github.com/Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline/pull/65
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

Resultado: Se creó exitosamente el Pull Request #65.

Cuerpo del PR: "Incluye ejemplos TDD (Jest) y BDD (Cucumber), workflows de CI y análisis (CodeQL, Snyk), y dependabot.yml.".

9.3. Ajustes Finales y Validación de Pipeline

Se realizaron ajustes finales en la rama feat/tests-tdd-bdd:

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh api -X PATCH repos/bapp86/AUY1102-Pipeline \
-f security_and_analysis[advanced_security][status]=enabled \
-f security_and_analysis[secret_scanning][status]=enabled
{
  "message": "Advanced security is always available for public repos.",
  "documentation_url": "https://docs.github.com/rest/repos/repos#update-a-repository",
  "status": "422"
}
gh: Advanced security is always available for public repos. (HTTP 422)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

1. Se agregó un workflow sonar.yml para el análisis con SonarCloud.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ git branch --show-current
feat/tests-tdd-bdd
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat << 'EOF' > .github/workflows/sonarcloud.yml
name: SonarCloud Analysis

on:
  push:
    branches: [ master, feat/tests-tdd-bdd ]
  pull_request:
    branches: [ master ]

jobs:
  sonarcloud:
    name: SonarCloud
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
        with:
          fetch-depth: 0 # Shallow clones should be disabled for a better analysis

      - name: Install dependencies
        run: npm ci

      - name: Run tests and coverage
        run: npm run test:coverage # Usamos el script que genera cobertura

      - name: SonarCloud Scan
        uses: SonarSource/sonarcloud-github-action@master
        env:
          GITHUB_TOKEN: ${{ secrets.GITHUB_TOKEN }} # Needed to get PR information
          SONAR_TOKEN: ${{ secrets.SONAR_TOKEN }}
          SONAR_ORG: ${{ secrets.SONAR_ORG }}

EOF
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```

2. Se modificó ci-tests.yml para incluir un paso de npm audit.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ cat << 'EOF' > .github/workflows/ci-tests.yml
name: CI - Tests and Coverage

on:
  push:
    branches: [ main, master, develop, feat/* ]
  pull_request:
    branches: [ main, master, develop ]

jobs:
  test:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4

      - name: Use Node
        uses: actions/setup-node@v4
        with:
          node-version: '18'

      - name: Install dependencies
        run: npm ci

      - name: Run security audit
        run: npm audit
        continue-on-error: true # <-- Esta es la corrección

      - name: Run tests and coverage
        run: npm run test -- --coverage

      - name: Upload coverage artifact
        uses: actions/upload-artifact@v4
        with:
          name: coverage-report
          path: coverage
EOF
```

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline git add .github/workflows/ci-tests.yml
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline git commit -m "ci(workflows): add npm audit step"
[feat/tests-tdd-bdd ee94396] ci(workflows): add npm audit step
  1 file changed, 9 insertions(+)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline git push fork
Enumerando objetos: 9, listo.
Contando objetos: 100% (9/9), listo.
Compresión delta usando hasta 4 hilos
Comprimiendo objetos: 100% (5/5), listo.
Escribiendo objetos: 100% (5/5), 497 bytes | 497.00 KiB/s, listo.
Total 5 (delta 4), reusados 0 (delta 0), pack-reusados 0
remote: Resolving deltas: 100% (4/4), completed with 4 local objects.
remote:
remote: GitHub found 4 vulnerabilities on bapp86/AUY1102-Pipeline's default branch (1 high, 2 moderate, 1 low). To
  find out more, visit:
remote:     https://github.com/bapp86/AUY1102-Pipeline/security/dependabot
remote:
To https://github.com/bapp86/AUY1102-Pipeline.git
  48a30bd..ee94396  feat/tests-tdd-bdd -> feat/tests-tdd-bdd
```

Se ajustaron los argumentos del comando en snyk-scan.yml.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline cat << 'EOF' > .github/workflows/snyk-scan.yml
name: Snyk Scan
on:
  push:
    branches: [ main, master, develop, feat/tests-tdd-bdd ]
  pull_request:
    branches: [ main, master, develop ]
jobs:
  snyk:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - name: Setup Node
        uses: actions/setup-node@v4
        with:
          node-version: '18'
      - name: Install deps
        run: npm ci
      - name: Run Snyk test
        uses: snyk/actions/node@master
        with:
          args: --all-projects --severity-threshold=low #
        env:
          SNYK_TOKEN: ${{ secrets.SNYK_TOKEN }}
EOF
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline git add .github/workflows/snyk-scan.yml
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline git commit -m "ci(workflows): fix snyk scan command arguments"
[feat/tests-tdd-bdd 34118a3] ci(workflows): fix snyk scan command arguments
  1 file changed, 3 insertions(+), 3 deletions(-)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline git push fork
Enumerando objetos: 9, listo.
Contando objetos: 100% (9/9), listo.
Compresión delta usando hasta 4 hilos
Comprimiendo objetos: 100% (5/5), listo.
Escribiendo objetos: 100% (5/5), 460 bytes | 460.00 KiB/s, listo.
Total 5 (delta 4), reusados 0 (delta 0), pack-reusados 0
remote: Resolving deltas: 100% (4/4), completed with 4 local objects.
remote:
remote: GitHub found 4 vulnerabilities on bapp86/AUY1102-Pipeline's default branch (1 high, 2 moderate, 1 low). To
  find out more, visit:
remote:     https://github.com/bapp86/AUY1102-Pipeline/security/dependabot
remote:
To https://github.com/bapp86/AUY1102-Pipeline.git
  ee3ded7..34118a3  feat/tests-tdd-bdd -> feat/tests-tdd-bdd
```

Tras estos commits, la lista de gh run list mostró que **todos los workflows** (SonarCloud, Snyk Scan, CI - Tests, CodeQL) en la rama feat/tests-tdd-bdd se completaron exitosamente (marcas de verificación verdes).

STATUS	TITLE	WORKFLOW	BRANCH	EVENT	ID	ELAPSED	AGE
✓	ci(workflows): al...	SonarCloud Ana...	feat/tests-tdd...	push	19205163828	1m12s	about 1 minute...
✓	ci(workflows): al...	Snyk Scan	feat/tests-tdd...	push	19205163822	59s	about 1 minute...
✓	ci(workflows): al...	CI - Tests and...	feat/tests-tdd...	push	19205163817	41s	about 1 minute...
✓	ci(workflows): al...	CodeQL Analysis	feat/tests-tdd...	push	19205163816	1m12s	about 1 minute...
✓	ci(workflows): fi...	CI - Tests and...	feat/tests-tdd...	push	19205108756	40s	about 6 minutes...
	ci(Workflow): f...	CodeQL Analys...	feat/tests-tdd...	push	19205108751	51s	about 6 minutes...

10. Conclusión

El trabajo se completó satisfactoriamente. Se configuró un repositorio, se clonó un proyecto base, se ejecutaron y ampliaron las pruebas, y se implementó un pipeline de CI robusto con múltiples verificaciones (pruebas, cobertura, linting, seguridad SAST y SCA).

El Pull Request #65 fue creado y validado por todas las acciones de CI. Solo a falta de la validación de la profesora.

```
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$ gh pr merge https://github.com/Fundacion-Instituto-Profesional-Duoc-UC/AUY1102-Pipeline/pull/65
Merging pull request #65 (Add TDD and BDD tests...)
? What merge method would you like to use? Create a merge commit
? Delete the branch locally? Yes
? What's next? Submit
GraphQL: bapp86 does not have the correct permissions to execute `MergePullRequest` (mergePullRequest)
bpainemilla@bpainemillavm001:~/projects/auy1102/AUY1102-Pipeline$
```