

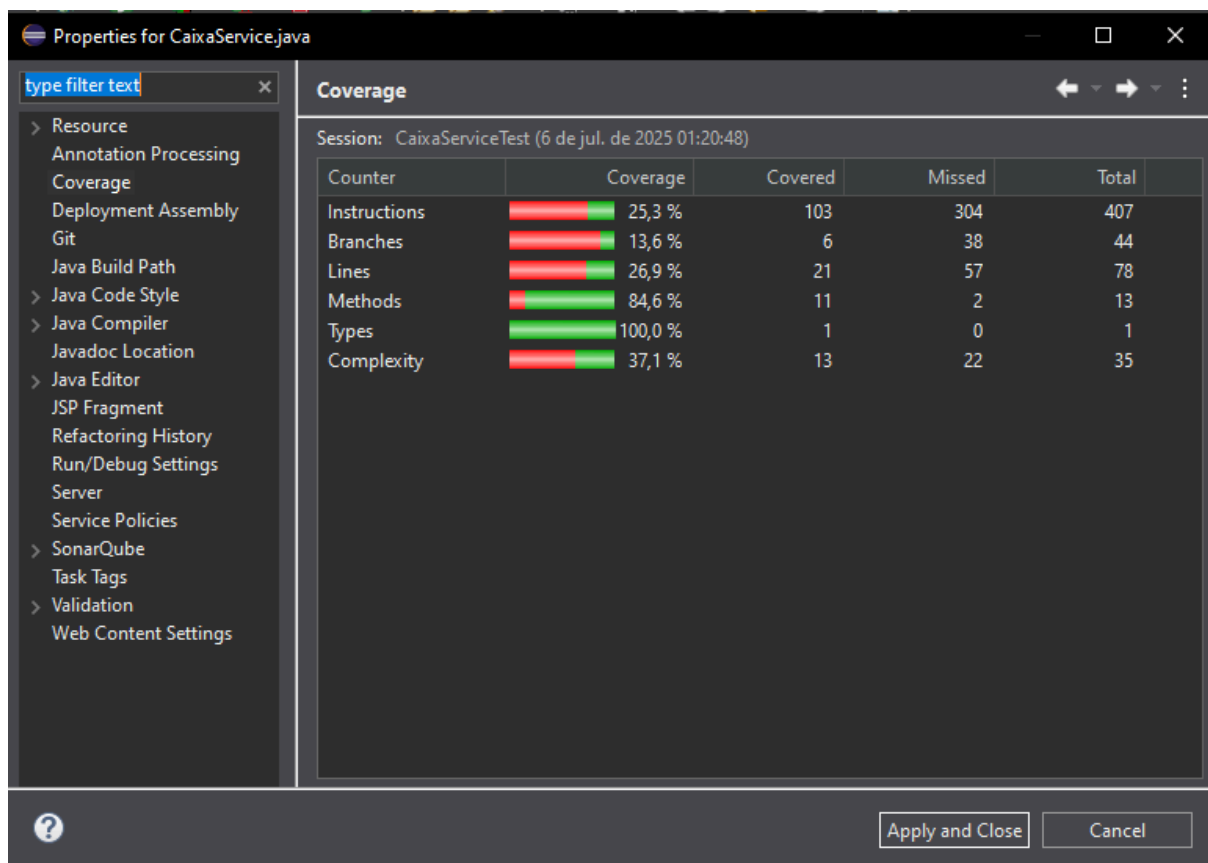
1. Resumo das Tarefas da Entrega

- Melhorar e aumentar os casos de testes unitários, isolando suas dependências: **FEITO**
- Implementar casos de teste de integração: **FEITO**
- Implementar testes de sistema considerando requisitos funcionais: **FEITO**
 - Selenium

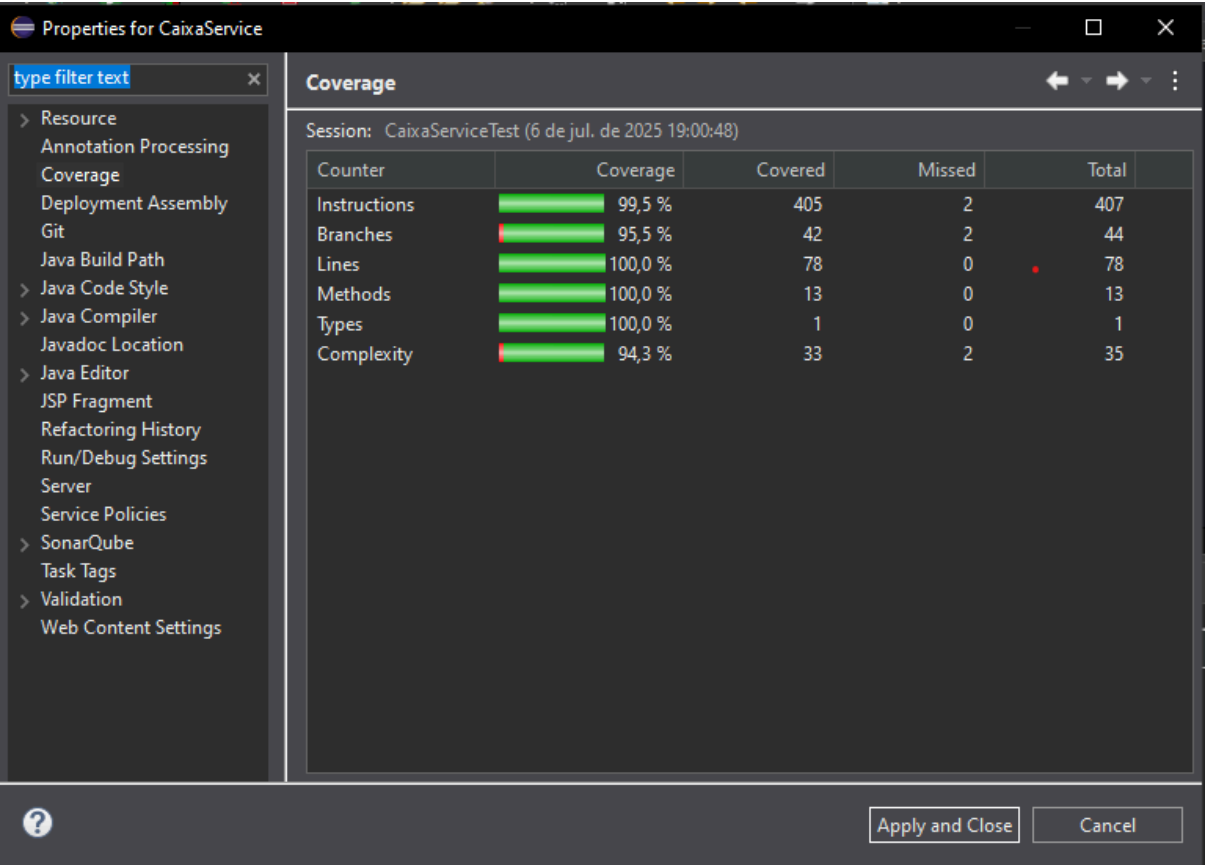
2. Teste Estrutural (Cobertura de Código)

O objetivo desta seção é mostrar a evolução da cobertura dos testes unitários na classe **CaixaService** entre a Entrega 1 e a Entrega 2. A meta é atingir pelo menos 80% de cobertura no critério "todas-arestas" (Branches).

2.1. Cobertura de Código para **CaixaService** - ENTREGA 1



2.2. Cobertura de Código para **CaixaService** - ENTREGA 2



3. Teste Baseado em Defeitos (Teste de Mutação)

Esta seção demonstra que os testes aprimorados são mais eficazes em encontrar defeitos, o que é medido pelo "escore de mutação". A meta é atingir um escore de pelo menos 80%.

3.1. Relatório de Mutação para CaixaService - ENTREGA 1

Pit Test Coverage Report

Package Summary

net.originmobi.pdv.service

Number of Classes	Line Coverage	Mutation Coverage	Test Strength
38	2% 21/900	4% 19/501	100% 19/19

Breakdown by Class

Name	Line Coverage	Mutation Coverage	Test Strength
AjusteProdutoService.java	0% 0/29	0% 0/15	0% 0/0
AjusteService.java	0% 0/35	0% 0/19	0% 0/0
CaixaLancamentoService.java	0% 0/31	0% 0/20	0% 0/0
CaixaService.java	27% 21/78	35% 19/54	100% 19/19

KILLED (22)
 pdv (22)
 > net.originmobi.pdv.filter (2)
 > net.originmobi.pdv.model (1)
 ▼ net.originmobi.pdv.service (19)
 ▼ net.originmobi.pdv.service.CaixaService (19)
 149: replaced boolean return with false for net/originmobi/pdv/service/CaixaService::caixasAberto
 149: replaced boolean return with true for net/originmobi/pdv/service/CaixaService::caixasAberto
 153: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaTodos
 157: negated conditional
 158: negated conditional
 159: removed call to net/originmobi/pdv/filter/CaixaFilter::setData_cadastro
 160: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listarCaixas
 164: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listarCaixas
 168: replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::caixaAberto
 172: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::caixasAbertos
 176: replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::busca
 183: replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::buscaCaixaUsuario
 187: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancos
 191: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaCaixasAbertosTipo
 195: negated conditional
 196: negated conditional
 197: removed call to net/originmobi/pdv/filter/BancoFilter::setData_cadastro
 198: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancosAbertosTipoFilterBanco
 202: replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancosAbertosTipoFilterBanco

net.originmobi.pdv.service.CaixaService (35)
 44: negated conditional
 44: negated conditional
 49: negated conditional
 50: removed call to net/originmobi/pdv/model/Caixa::setValor_abertura
 52: changed conditional boundary
 52: negated conditional
 58: negated conditional
 59: negated conditional
 60: negated conditional
 61: negated conditional
 62: negated conditional
 63: negated conditional
 67: removed call to net/originmobi/pdv/model/Caixa::setDescricao
 68: removed call to net/originmobi/pdv/model/Caixa::setUsuario
 69: removed call to net/originmobi/pdv/model/Caixa::setData_cadastro
 72: negated conditional
 73: removed call to java/io/PrintStream::println
 74: removed call to java/io/PrintStream::println
 75: removed call to net/originmobi/pdv/model/Caixa::setAgencia
 76: removed call to net/originmobi/pdv/model/Caixa::setConta
 86: changed conditional boundary
 86: negated conditional
 89: negated conditional
 90: negated conditional
 104: removed call to net/originmobi/pdv/model/Caixa::setValor_total
 107: replaced Long return value with 0L for net/originmobi/pdv/service/CaixaService::cadastro
 117: negated conditional
 118: replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa
 120: negated conditional
 125: negated conditional
 128: negated conditional
 132: removed call to net/originmobi/pdv/model/Caixa::setData_fechamento
 133: removed call to net/originmobi/pdv/model/Caixa::setValor_fechamento
 141: replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa
 144: replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa

Mutations

```
44 1. negated conditional → NO_COVERAGE
    2. negated conditional → NO_COVERAGE
49 1. negated conditional → NO_COVERAGE
50 1. removed call to net/originmobi/pdv/model/Caixa::setValor_abertura → NO_COVERAGE
52 1. changed conditional boundary → NO_COVERAGE
    2. negated conditional → NO_COVERAGE
58 1. negated conditional → NO_COVERAGE
59 1. negated conditional → NO_COVERAGE
60 1. negated conditional → NO_COVERAGE
61 1. negated conditional → NO_COVERAGE
62 1. negated conditional → NO_COVERAGE
63 1. negated conditional → NO_COVERAGE
67 1. removed call to net/originmobi/pdv/model/Caixa::setDescricao → NO_COVERAGE
68 1. removed call to net/originmobi/pdv/model/Caixa::setUsuario → NO_COVERAGE
69 1. removed call to net/originmobi/pdv/model/Caixa::setData_cadastro → NO_COVERAGE
72 1. negated conditional → NO_COVERAGE
73 1. removed call to java/io/PrintStream::println → NO_COVERAGE
74 1. removed call to java/io/PrintStream::println → NO_COVERAGE
75 1. removed call to net/originmobi/pdv/model/Caixa::setAgencia → NO_COVERAGE
76 1. removed call to net/originmobi/pdv/model/Caixa::setConta → NO_COVERAGE
86 1. changed conditional boundary → NO_COVERAGE
    2. negated conditional → NO_COVERAGE
89 1. negated conditional → NO_COVERAGE
90 1. negated conditional → NO_COVERAGE
104 1. removed call to net/originmobi/pdv/model/Caixa::setValor_total → NO_COVERAGE
107 1. replaced long return value with 0L for net/originmobi/pdv/service/CaixaService::cadastro → NO_COVERAGE
117 1. negated conditional → NO_COVERAGE
118 1. replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa → NO_COVERAGE
120 1. negated conditional → NO_COVERAGE
125 1. negated conditional → NO_COVERAGE
128 1. negated conditional → NO_COVERAGE
132 1. removed call to net/originmobi/pdv/model/Caixa::setData_fechamento → NO_COVERAGE
133 1. removed call to net/originmobi/pdv/model/Caixa::setValor_fechamento → NO_COVERAGE
141 1. replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa → NO_COVERAGE
144 1. replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa → NO_COVERAGE
```

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```
149 1. replaced boolean return with false for net/originmobi/pdv/service/CaixaService::caixaIsAberto → KILLED
    2. replaced boolean return with true for net/originmobi/pdv/service/CaixaService::caixaIsAberto → KILLED
153 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaTodos → KILLED
157 1. negated conditional → KILLED
158 1. negated conditional → KILLED
159 1. removed call to net/originmobi/pdv/filter/CaixaFilter::setData_cadastro → KILLED
160 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listarCaixas → KILLED
164 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listarCaixas → KILLED
168 1. replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::caixaAberto → KILLED
172 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::caixasAbertos → KILLED
176 1. replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::busca → KILLED
183 1. replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::buscaCaixaUsuario → KILLED
187 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancos → KILLED
191 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaCaixasAbertosTipo → KILLED
195 1. negated conditional → KILLED
196 1. negated conditional → KILLED
197 1. removed call to net/originmobi/pdv/filter/BancoFilter::setData_cadastro → KILLED
198 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancosAbertosTipoFilterBanco → KILLED
202 1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancosAbertosTipoFilterBanco → KILLED
```

3.2. Relatório de Mutação para CaixaService - ENTREGA 2

Pit Test Coverage Report

Package Summary

net.originmobi.pdv.service

Number of Classes	Line Coverage	Mutation Coverage	Test Strength
38	9% <div><div></div></div> 78/900	9% <div><div></div></div> 47/501	87% <div><div></div></div> 47/54

Breakdown by Class

Name	Line Coverage	Mutation Coverage	Test Strength
AjusteProdutoService.java	0% <div><div></div></div> 0/29	0% <div><div></div></div> 0/15	0% <div><div></div></div> 0/0
AjusteService.java	0% <div><div></div></div> 0/35	0% <div><div></div></div> 0/19	0% <div><div></div></div> 0/0
CaixaLancamentoService.java	0% <div><div></div></div> 0/31	0% <div><div></div></div> 0/20	0% <div><div></div></div> 0/0
CaixaService.java	100% <div><div></div></div> 78/78	87% <div><div></div></div> 47/54	87% <div><div></div></div> 47/54

✓ SURVIVED (9)
pdv (9)
net.originmobi.pdv.model (1)
net.originmobi.pdv.service (7)
net.originmobi.pdv.service.CaixaService (7)
68: removed call to net/originmobi/pdv/model/Caixa::setUsuario
69: removed call to net/originmobi/pdv/model/Caixa::setData_cadastro
73: removed call to java/io/PrintStream::println
74: removed call to java/io/PrintStream::println
89: negated conditional
90: negated conditional
107: replaced Long return value with 0L for net/originmobi/pdv/service/CaixaService::cadastro
net.originmobi.pdv.singleton (1)
KILLED (61)
pdv (61)
net.originmobi.pdv.filter (2)
net.originmobi.pdv.model (10)
net.originmobi.pdv.service (47)
net.originmobi.pdv.service.CaixaService (47)
44: negated conditional
44: negated conditional
49: negated conditional
50: removed call to net/originmobi/pdv/model/Caixa::setValor_abertura
52: changed conditional boundary
52: negated conditional
58: negated conditional
59: negated conditional
60: negated conditional
61: negated conditional
62: negated conditional
63: negated conditional
67: removed call to net/originmobi/pdv/model/Caixa::setDescricao
72: negated conditional
75: removed call to net/originmobi/pdv/model/Caixa::setAgencia
76: removed call to net/originmobi/pdv/model/Caixa::setConta
86: changed conditional boundary
86: negated conditional
104: removed call to net/originmobi/pdv/model/Caixa::setValor_total
117: negated conditional
118: replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa
120: negated conditional

Mutations

44	1. negated conditional → KILLED
	2. negated conditional → KILLED
49	1. negated conditional → KILLED
50	1. removed call to net/originmobi/pdv/model/Caixa::setValor_abertura → KILLED
52	1. changed conditional boundary → KILLED
	2. negated conditional → KILLED
58	1. negated conditional → KILLED
59	1. negated conditional → KILLED
60	1. negated conditional → KILLED
61	1. negated conditional → KILLED
62	1. negated conditional → KILLED
63	1. negated conditional → KILLED
67	1. removed call to net/originmobi/pdv/model/Caixa::setDescricao → KILLED
68	1. removed call to net/originmobi/pdv/model/Caixa::setUsuario → SURVIVED
69	1. removed call to net/originmobi/pdv/model/Caixa::setData_cadastro → SURVIVED
72	1. negated conditional → KILLED
73	1. removed call to java/io/PrintStream::println → SURVIVED
74	1. removed call to java/io/PrintStream::println → SURVIVED
75	1. removed call to net/originmobi/pdv/model/Caixa::setAgencia → KILLED
76	1. removed call to net/originmobi/pdv/model/Caixa::setConta → KILLED
86	1. changed conditional boundary → KILLED
	2. negated conditional → KILLED
89	1. negated conditional → SURVIVED
90	1. negated conditional → SURVIVED
104	1. removed call to net/originmobi/pdv/model/Caixa::setValor_total → KILLED
107	1. replaced long return value with 0L for net/originmobi/pdv/service/CaixaService::cadastro → SURVIVED
117	1. negated conditional → KILLED
118	1. replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa → KILLED
120	1. negated conditional → KILLED
125	1. negated conditional → KILLED
128	1. negated conditional → KILLED
132	1. removed call to net/originmobi/pdv/model/Caixa::setData_fechamento → KILLED
133	1. removed call to net/originmobi/pdv/model/Caixa::setValor_fechamento → KILLED
141	1. replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa → KILLED

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144	1. replaced return value with "" for net/originmobi/pdv/service/CaixaService::fechaCaixa → KILLED
149	1. replaced boolean return with false for net/originmobi/pdv/service/CaixaService::caixaIsAberto → KILLED
	2. replaced boolean return with true for net/originmobi/pdv/service/CaixaService::caixaIsAberto → KILLED
153	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaTodos → KILLED
157	1. negated conditional → KILLED
158	1. negated conditional → KILLED
159	1. removed call to net/originmobi/pdv/filter/CaixaFilter::setData_cadastro → KILLED
160	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listarCaixas → KILLED
164	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listarCaixas → KILLED
168	1. replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::caixaAberto → KILLED
172	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::caixasAbertos → KILLED
176	1. replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::busca → KILLED
183	1. replaced return value with Optional.empty for net/originmobi/pdv/service/CaixaService::buscaCaixaUsuario → KILLED
187	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancos → KILLED
191	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaCaixasAbertosTipo → KILLED
195	1. negated conditional → KILLED
196	1. negated conditional → KILLED
197	1. removed call to net/originmobi/pdv/filter/BancoFilter::setData_cadastro → KILLED
198	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancosAbertosTipoFilterBanco → KILLED
202	1. replaced return value with Collections.emptyList for net/originmobi/pdv/service/CaixaService::listaBancosAbertosTipoFilterBanco → KILLED

4. Análise de Qualidade de Código (SonarQube)

Aqui, mostramos que a qualidade do código-fonte da classe `CaixaService` foi analisada e, se necessário, melhorada, seguindo as sugestões da ferramenta.

4.1. Relatório SonarQube para CaixaService - ENTREGA 1

Date	Description	Resource
1 month ago	Call "Optional.isPresent()" before accessing the value.	CaixaService.j...
1 month ago	Call "caixaAtual.isPresent()" before accessing the value.	CaixaService.j...
1 month ago	Define and throw a dedicated exception instead of using a generic one.	CaixaService.j...
1 month ago	Define and throw a dedicated exception instead of using a generic one.	CaixaService.j...
1 month ago	Define and throw a dedicated exception instead of using a generic one.	CaixaService.j...
1 month ago	Define and throw a dedicated exception instead of using a generic one.	CaixaService.j...
1 month ago	Define and throw a dedicated exception instead of using a generic one.	CaixaService.j...
1 month ago	Define and throw a dedicated exception instead of using a generic one.	CaixaService.j...
1 month ago	Extract this nested ternary operation into an independent statement.	CaixaService.j...
1 month ago	Immediately return this expression instead of assigning it to the temporary variable "caixaOptional".	CaixaService.j...
1 month ago	Merge this if statement with the enclosing one. [-1 location]	CaixaService.j...
1 month ago	Merge this if statement with the enclosing one. [-1 location]	CaixaService.j...
1 month ago	Refactor this method to reduce its Cognitive Complexity from 24 to the 15 allowed. [+17 locations]	CaixaService.j...
1 month ago	Remove the "usuario" field and declare it as a local variable in the relevant methods.	CaixaService.j...
1 month ago	Remove this field injection and use constructor injection instead.	CaixaService.j...
1 month ago	Remove this field injection and use constructor injection instead.	CaixaService.j...
1 month ago	Remove this field injection and use constructor injection instead.	CaixaService.j...
1 month ago	Rename "usuario" which hides the field declared at line 30.	CaixaService.j...
1 month ago	Replace this use of System.out by a logger.	CaixaService.j...
1 month ago	Replace this use of System.out by a logger.	CaixaService.j...

4.2. Relatório SonarQube para CaixaService - ENTREGA 2

The screenshot shows the SonarQube On-The-Fly web interface. At the top, there is a navigation bar with tabs for Problems, Terminal, Javadoc, Declaration, Console, Progress, SonarQube On-The-Fly (active), Coverage, PIT Mutations, and PIT Summary. Below the navigation bar, the main content area displays a table with the following structure:

Date	Description	Resource
------	-------------	----------

The table is currently empty, showing only the header row. The interface has a dark theme.

5. Selenium

5.1. Testes de Abertura de Caixa

- `testAbrirCaixaCofre()`: Testa a abertura de cofre.
- `testAbrirCaixaBanco()`: Testa a abertura de caixa bancário.

5.2. Testes de Fechamento de Caixa

- `testFecharCaixa()`: Testa o fechamento de caixa com senha.

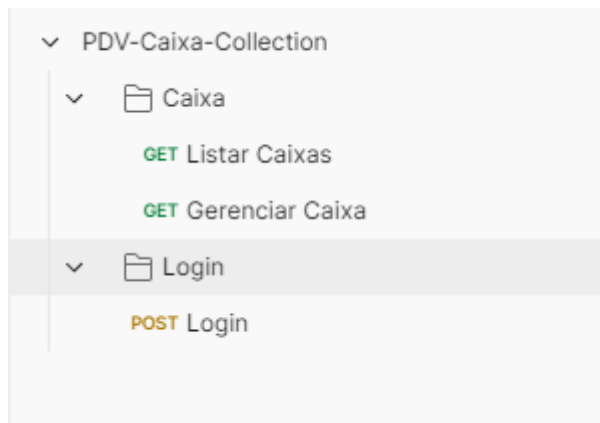
5.3. Testes de Busca e Consulta

- `testBuscarCaixa()`: Testa a funcionalidade de busca.

5.4. Testes de Validação

- `testAbrirCaixaComValorNegativo()`: Testa a validação de valor negativo.

6. Teste de integração usando Postman



7. Resumo das Melhorias Implementadas

Melhorias Realizadas nos Testes Unitários do CaixaService

- Aumento da Cobertura de Testes:

Ampliamos significativamente a cobertura dos testes unitários da classe `CaixaService`, com especial atenção aos métodos críticos de negócio, como `cadastro()` e `fechaCaixa()`. Isso garante maior confiabilidade e robustez nas operações essenciais do sistema.

- Cobertura de Cenários de Erro e Casos de Borda:

Foram implementados testes específicos para validar o comportamento do serviço em situações de exceção e limites, incluindo:

- Tentativa de cadastro de caixa com valor de abertura negativo.
- Tentativa de abertura de um novo caixa do tipo CAIXA quando já existe outro aberto.
- Tentativa de fechamento de caixa utilizando senha incorreta ou em branco.
- Verificação do comportamento ao tentar fechar um caixa que já foi previamente fechado.
- Isolamento de Dependências e Estratégias de Mock:

Para garantir a independência dos testes em relação ao ambiente e a outros componentes, foram aplicadas técnicas de mock:

- O `UsuarioService` foi simulado para controlar o retorno do singleton `Aplicacao.getInstancia()`, sem necessidade de alterar o código de produção.
- Para a validação de senha com `BCryptPasswordEncoder`, os testes passaram a gerar hashes reais e a validar tanto o cenário de senha correta quanto o de senha incorreta, evitando a necessidade de mockar a criação de novos objetos.
- Refatoração e Melhoria da Qualidade do Código:
- A classe `CaixaService` foi refatorada para aprimorar a clareza e a manutenção do código, substituindo o uso de `RuntimeException` genérica por uma exceção de domínio específica (por exemplo, `CaixaException`). Essa alteração segue as recomendações de ferramentas de análise estática como o SonarQube e contribui para um tratamento de erros mais adequado e informativo.