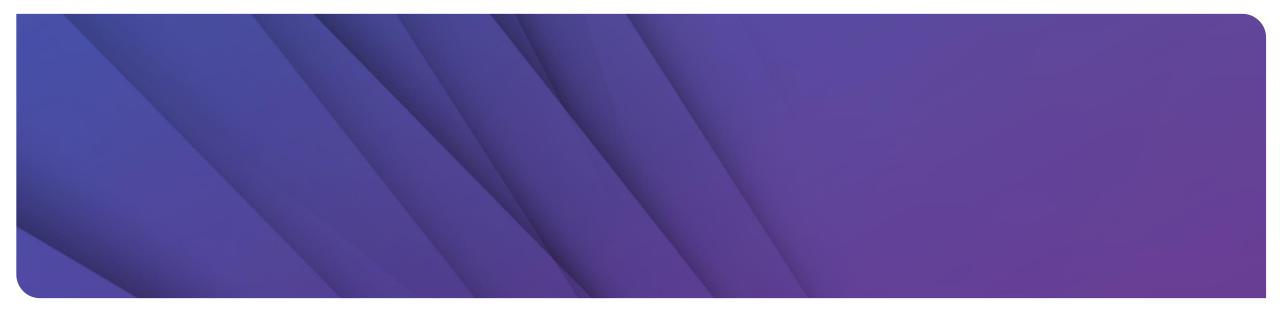


Palladio Fluent API Model Generator – Usage Model

Eva-Maria Neumann

Praktikum: Werkzeuge für Agile Modellierung

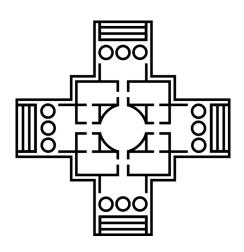
Betreuer: Yves Kirschner



Inhalt



- Motivation
- Grundlagen
 - Palladio Model
 - Fluent Interfaces
- Palladio Fluent API
 - Vorarbeiten
 - Besonderheiten Usage Model



Motivation



- Graphische Editoren
 - Unübersichtlich bei großen Modellen
 - Viel Klicken

- + Anschaulich
- + Benutzerfreundlich
- + Für Einsteiger geeignet

- Textuell
 - Aufwändig
 - Viel Quelltext
 - Unverständlich
 - Unübersichtlich
 - + Hohe Lernkurve
 - + Schneller

Fluent Interfaces



- Natürliche Sprache
- Verkettung von Methoden

```
private void makeNormal(Customer customer) {
   Order o1 = new Order();
   customer.addOrder(o1);
   OLine line1 = new OLine(6,product(,,Eier"));
   o1.addLine(line1);
   OLine line2 = new OLine(5,product(,,Tomate"));
   o1.addLine(line2);
   OLine line3 = new OLine(3,product(,Gurke"));
   o1.addLine(line3);
   line2.setSkippable(true);
   o1.setRush(true);
```

- Besser Vorstellbar
- Weniger Fehler

```
private void makeFluent(Customer customer) {
   customer.newOrder()
        .with(6, "Eier")
        .with(5, "Tomate").skippable()
        .with(3, ,,Gurke")
        .priorityRush();
```

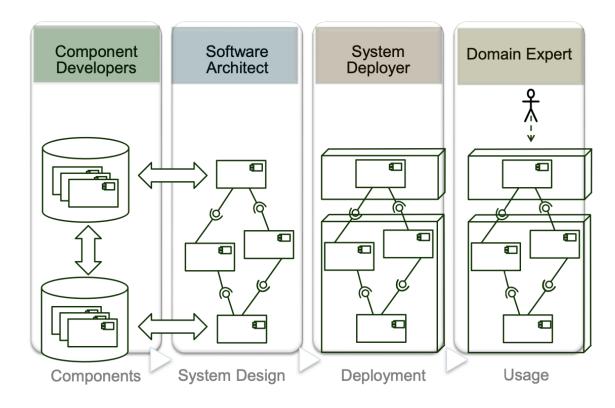
Lesbarer, Kompakter Code

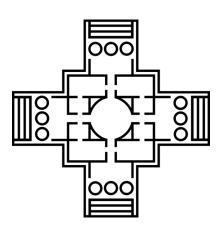
Quelle: https://martinfowler.com/bliki/FluentInterface.html

Palladio Component Model



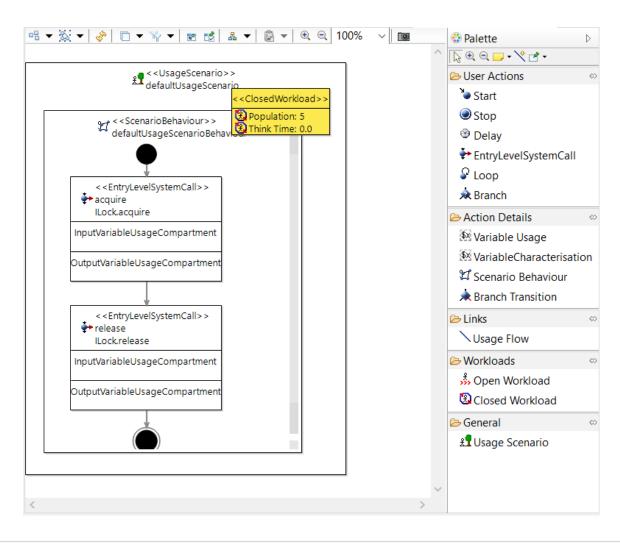
- Palladio: Ansatz zur Software Architektur Simulation
- PCM: Domänspezifische Modellsprache mit Metamodell





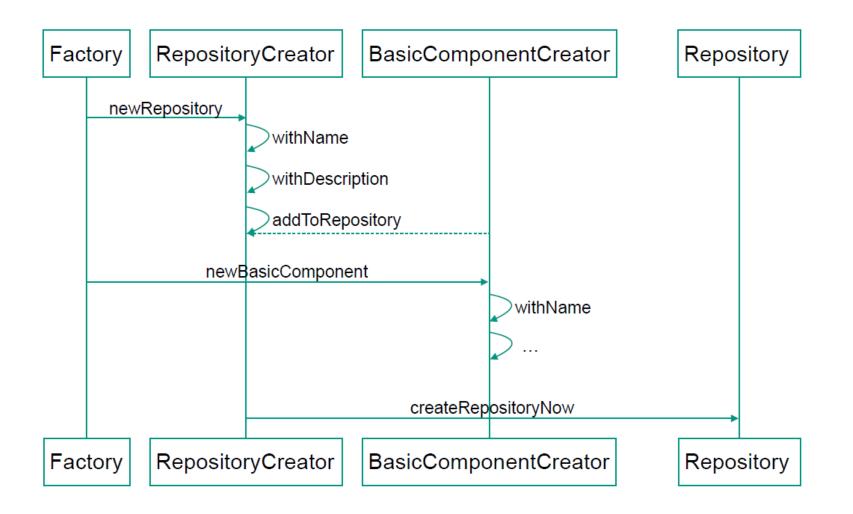


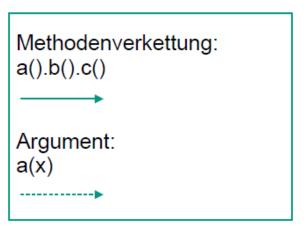




Palladio Fluent API - Vorarbeiten



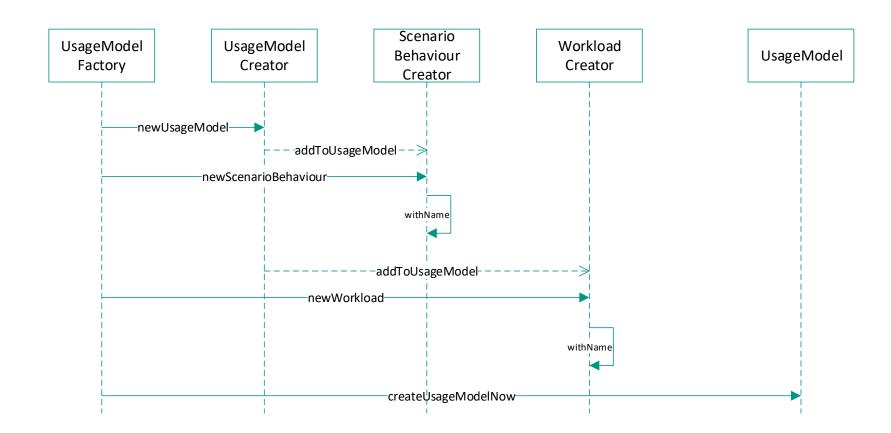


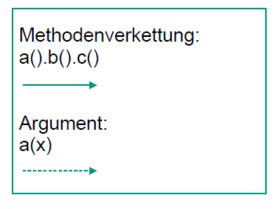


Quelle: Folie von Louisa Lambrecht

Übertragung auf Usage Model







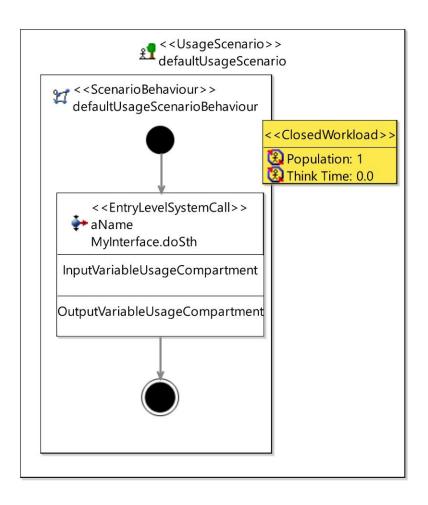
Besonderheiten Usage Model



- Aufbau Fluent API Usage Model in eigener Factory
- Verkettung von Aktionen
 - Start/ Stop automatisiert hinzufügen
 - Reihenfolge wichtig
- Unterstützung der Verifikation durch Parameter
 - Etwas unübersichtlicher
 - Vermeidung von Fehlern
 - Einfach Erzeugung von gültigem Model

Usage Model - Beispiel

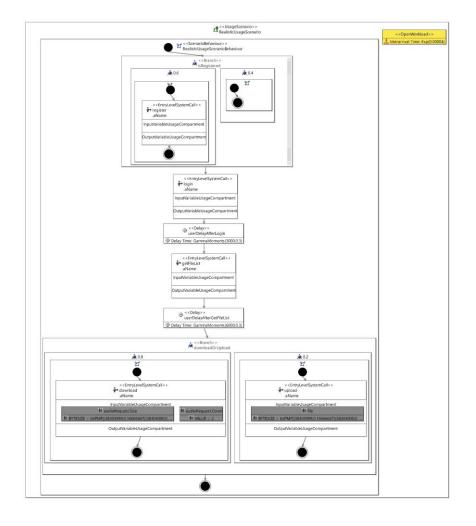




Usage Model – Weiteres Beispiel



```
UsageModel usgModel = this.create.addSystem(mediaStoreMockUp()).newUsageModel().addToUsageModel(
        this.create.newUsageScenario(
                this.create.newScenarioBehavior().withName("RealisticUsageScenarioBehaviour")
                .addToScenarioBehaviour(
                        this.create.newStartAction().withName("startUsage").withSuccessor(
                        this.create.newBranchAction().withName("isRegistered")
                            .addToBranchAction(this.create.newBranchTransition(this.create.newScenarioBehavior().addToScenarioBehaviour(
                                    this.create.newEntryLevelSystemCall(
                                            this.create.fetchOffOperationRoleAndSignature("defaultSystem", "Provided IWebGui", "register")).withName(
                                    .withName("needsToRegister")).withProbability(0.6))
                                    this.create.newBranchTransition(this.create.newScenarioBehavior().withName("isAlreadyRegistered")
                                    ).withProbability(0.4)).withSuccessor(
                        this.create.newEntryLevelSystemCall(
                                this.create.fetchOffOperationRoleAndSignature("defaultSystem", "Provided IWebGui", "login"))
                                .withName("login").withSuccessor(
                        this.create.newDelayAction("GammaMoments(3000,0.3)").withName("userDelayAfterLogin").withSuccessor(
                        this.create.newEntryLevelSystemCall(
                                this.create.fetchOffOperationRoleAndSignature("defaultSystem","Provided_IWebGui","getFileList"))
                                .withName("getFileList").withSuccessor(
                        this.create.newDelayAction("GammaMoments(6000,0.3)").withName("userDelayAfterGetFileList").withSuccessor(
                        this.create.newBranchAction().withName("downloadOrUpload")
                             .addToBranchAction(this.create.newBranchTransition(this.create.newScenarioBehavior().withName("downloadCase")
                                    .addToScenarioBehaviour(this.create.newEntryLevelSystemCall(
                                            this.create.fetchOffOperationRoleAndSignature("defaultSystem", "Provided_IWebGui", "download"))
                                            .withName("download")
                                            .addToEntryLevelSystemCallInput(
                                                    this.create.newVariableUsage("audioRequest", "Size")
                                                     .withVariableCharacterisation("IntPMF[(38303999;0.16666667)(38304000;0.16666667)(40568000;0.1666
                                             .addToEntryLevelSystemCallInput(
                                                    this.create.newVariableUsage("audioRequest", "Count")
                                                     .withVariableCharacterisation("2", VariableCharacterisationType.VALUE))
                                            )).withProbability(0.8))
                            .addToBranchAction(this.create.newBranchTransition(this.create.newScenarioBehavior().withName("uploadCase")
                                    .addToScenarioBehaviour(this.create.newEntryLevelSystemCall(
                                            this.create.fetchOffOperationRoleAndSignature("defaultSystem", "Provided_IWebGui", "upload"))
                                            .withName("upload").addToEntryLevelSystemCallInput(
                                                    this.create.newVariableUsage("file").withVariableCharacterisation("IntPMF[(38303999;0.16666667)(
                                            )).withProbability(0.2)).withSuccessor(
                        this.create.newStopAction().withName("stopUsage"))))))))),
                this.create.newOpenWorkload("Exp(0.00004)")).withName("RealisticUsageScenario"))
        .createUsageModelNow():
```



Ohne Verifikation



- UsageScenario
 - Hat genau ein ScenarioBehavior
 - Hat genau einen Workload (mit Zeit)

```
UsageModel usgModel = create.newUsageModel().addToUsageModel(
    create.newUsageScenario()
         .addToUsageScenario(create.newScenarioBehavior())
         .addToUsageScenario(create.newOpenWorkload()
             .withArrivalTime("10")))
    .withName(name))
.createUsageModelNow();
```

Mit Verifikation



- UsageScenario
 - Hat genau ein ScenarioBehavior
 - Hat genau einen Workload (mit Zeit)

```
UsageModel usgModel = create.newUsageModel().addToUsageModel(
    create.newUsageScenario(
        create.newScenarioBehavior(),
         create.newOpenWorkload("10"))
    .withName(name))
.createUsageModelNow();
```

Verifikation



```
create.newBranchAction().withName(name).addToBranchAction(
    create.newBranchTransition(
        create.newScenarioBehavior().withName(scenName))
    .withProbability(prop)))
```

Problem: Wahrscheinlichkeit nicht überprüfbar

```
org.palladiosimulator.generator.fluent.shared.validate.ModelValidator
logResult
SCHWERWIEGEND: Validation for model "UsageModel": Diagnostic ERROR
source=org.palladiosimulator.pcm.usagemodel code=0 The
'allBranchProbabilitiesMustSumUpTo1' constraint is violated on
'org.palladiosimulator.pcm.usagemodel.impl.BranchImpl@4ef18604{#_02Mo5hcBEey7
T-wAh8Eu0g}' data=[Branch[TRANSIENT]]
```

Verkettung Aktionen



- ScenarioBehaviour hat Aktionen
 - Aktion: Vorgänger, Nachfolger
 - Erste: Immer Start
 - Letzte: Immer Stop

```
UsageModel usgModel = create.addSystem(createSimplifiedMediaStoreSystem())
       .newUsageModel().addToUsageModel(create.newUsageScenario(
         create.newScenarioBehavior()
             .addToScenarioBehaviour(
        create.newOpenWorkload("0")))
    .createUsageModelNow();
```





```
.addToScenarioBehaviour(create.newStartAction())
.addToScenarioBehaviour(create.newDelayAction("10"))
.addToScenarioBehaviour(create.newBranchAction())
.addToScenarioBehaviour(create.newEntryLevelSystemCall(
    create.fetchOffOperationRoleAndSignature
    ("SimplifiedMediaStore System", provRoleName, operSigName))
.addToScenarioBehaviour(create.newLoopAction("1",
    create.newScenarioBehavior())
.addToScenarioBehaviour( create.newStopAction())
```

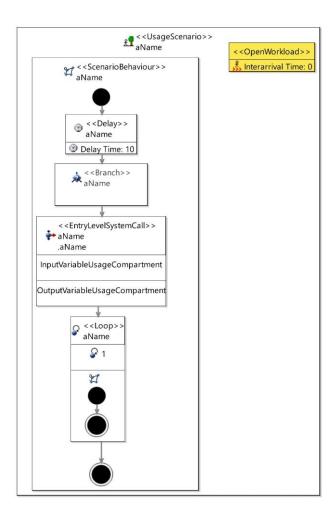
- Fehlend: Verkettung
- Problem: Verweis

Verkettung Aktionen



```
create.newStartAction().withSuccessor(
    create.newDelayAction("10").withSuccessor(
         create.newBranchAction().withSuccessor(
             create.newEntryLevelSystemCall(
                  create.fetchOffOperationRoleAndSignature
                  ("System", provRoleName, operSigName))
                  .withSuccessor(
                      create.newLoopAction("1",
                      create.newScenarioBehavior())
                      .withSuccessor(
                           create.newStopAction())))
```

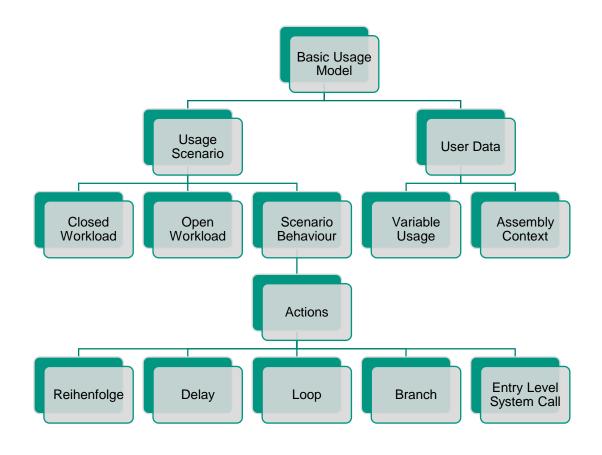
- Prüfung auf Start und Stop
- Vorgänger markieren



Test



- Vorher
 - Modell per Fluent API aufbauen
 - Modell normal aufbauen
 - Vergleichen
- Jetzt
 - Modelle per Fluent API aufbauen
 - Unit Test von Bereichen und deren Parametern
 - Zusätzlich großer Test: "Realistic Media Store"





Fragen?