Master Software Technology
Business Process Technology – [06]
Workflows using Camunda

Bloom's Taxonomy Verbs
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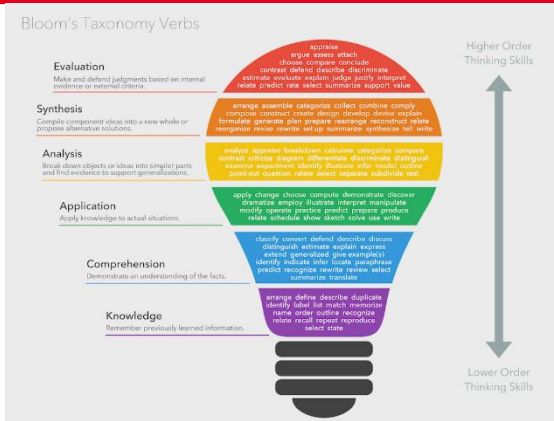


Learning Goals

- ✓ Understand Workflows in Camunda
- ✓ Model and execute workflows using Camunda
- ✓ Compare using Web Services in WS-BPEL and Camunda-based Workflows

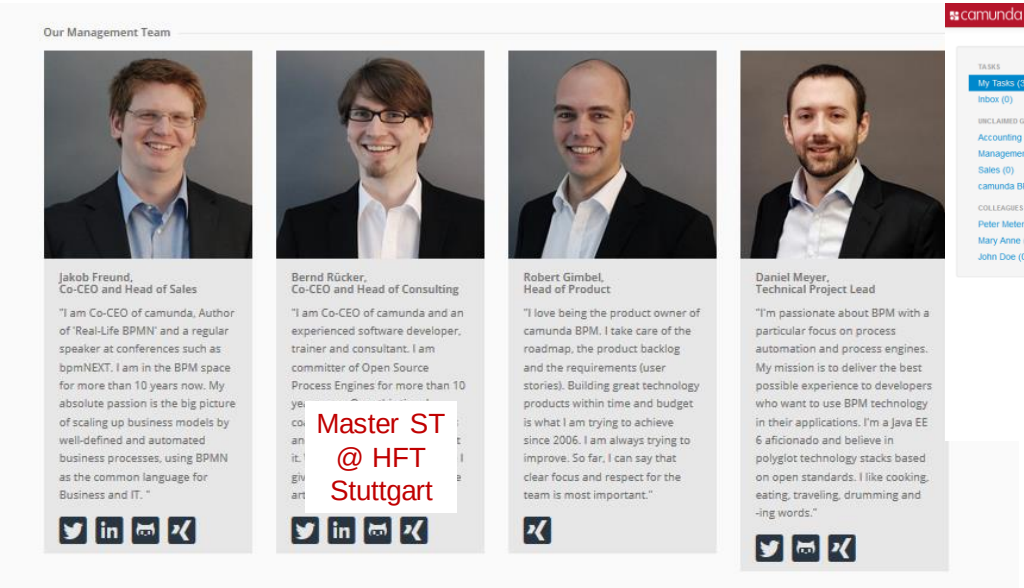
Agenda

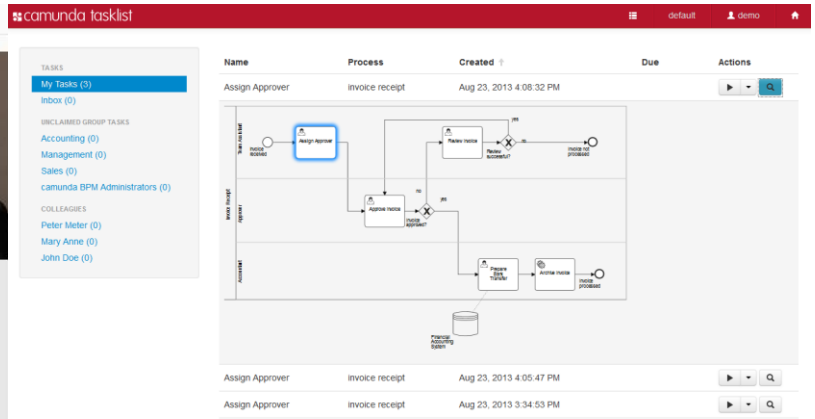
Camunda background
Camunda module structure according to the WfMC schema
Camunda workflow modeling
- WS-SOAP-based Web Service usage
- ReSTful Web Service usage

Integrated Tool Example: Camunda

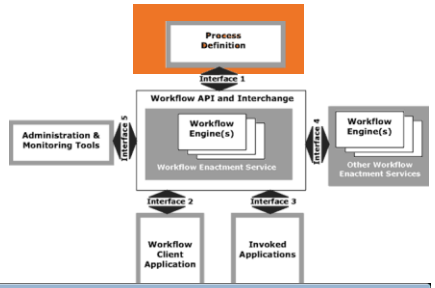
Java-based BPM-/BRM-/Workflow Management-System

- Open Source (camunda.org)
- Very successful also in big enterprises (usually Enterprise Version)
- One founder (Bernd Rücker) studied Master ST @ HFT Stuttgart



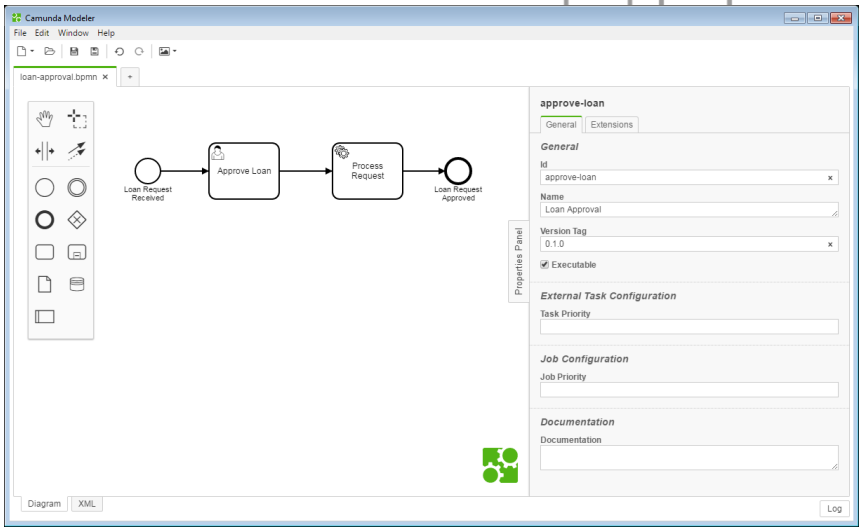


Camunda: Structure according to the WfMC reference model



Camunda Modeler

- Standalone Tool
- File based, export of .bpmn files
- BPMN 2.0 and CMMN/DMN modelling
- Properties pane on the right hand side
- Coded functionality usally by integrating with Eclipse and Maven



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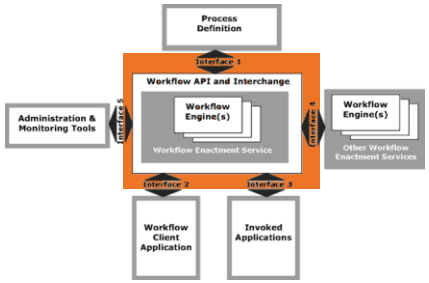
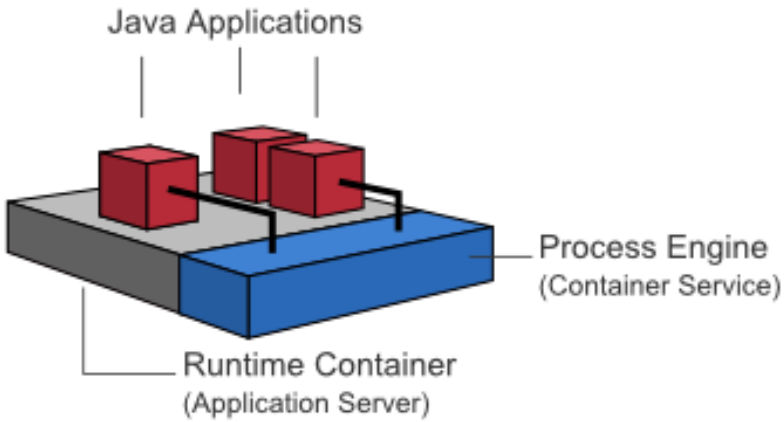
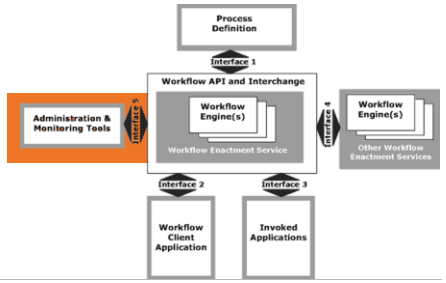


Camunda Workflow engine

- Java-based
- Runs sharing the Web container (e.g. Apache Tomcat) with the application(s)
  - Alternative Embedded Mode: integrated with application
  - Alternative Remote Mode: separate compute node

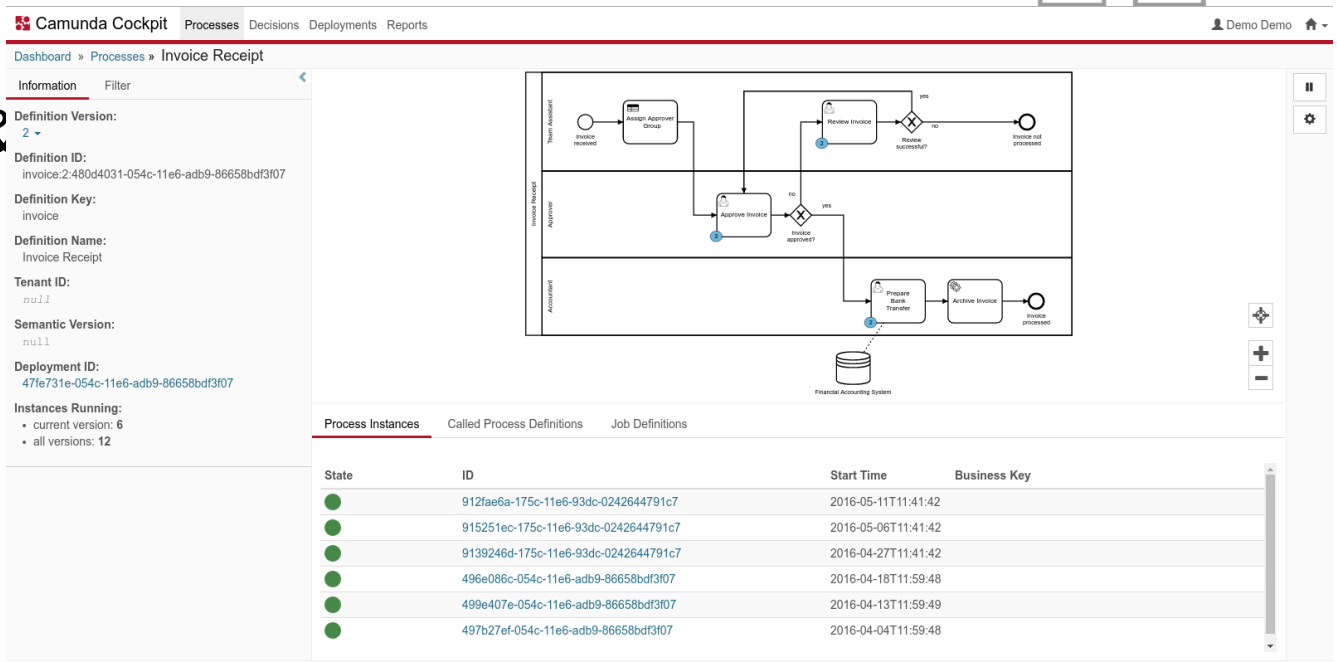


Camunda: Structure according to the WfMC reference model



Camunda Cockpit

- Monitoring processes & instances
- Tracing the current status



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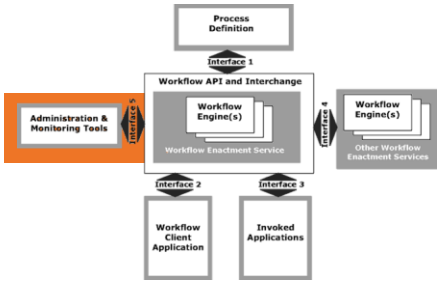
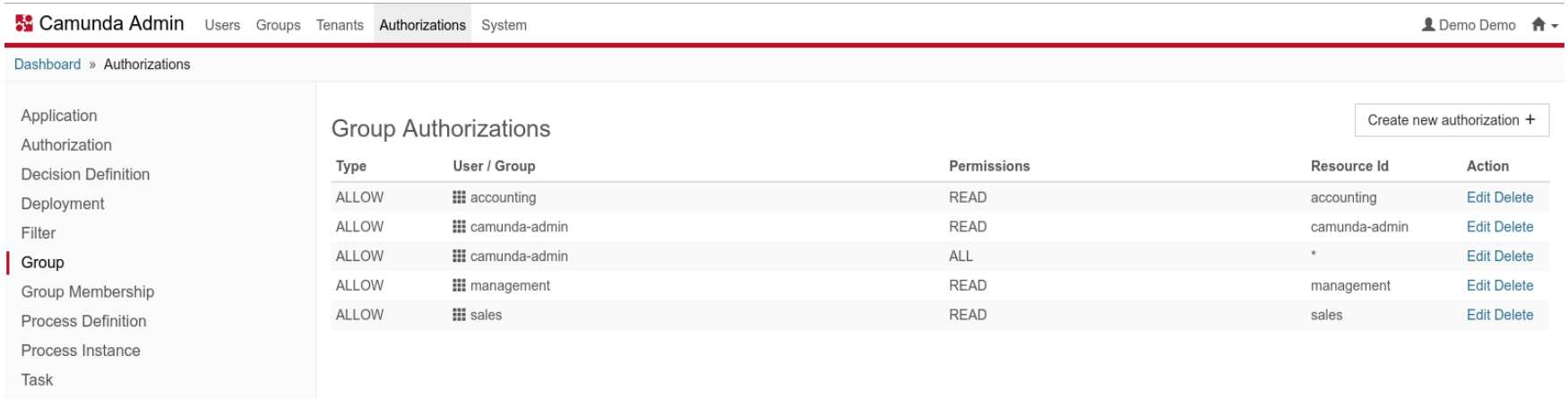
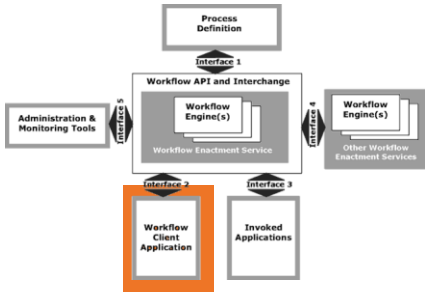


Camunda Admin

- Account and Rights Management

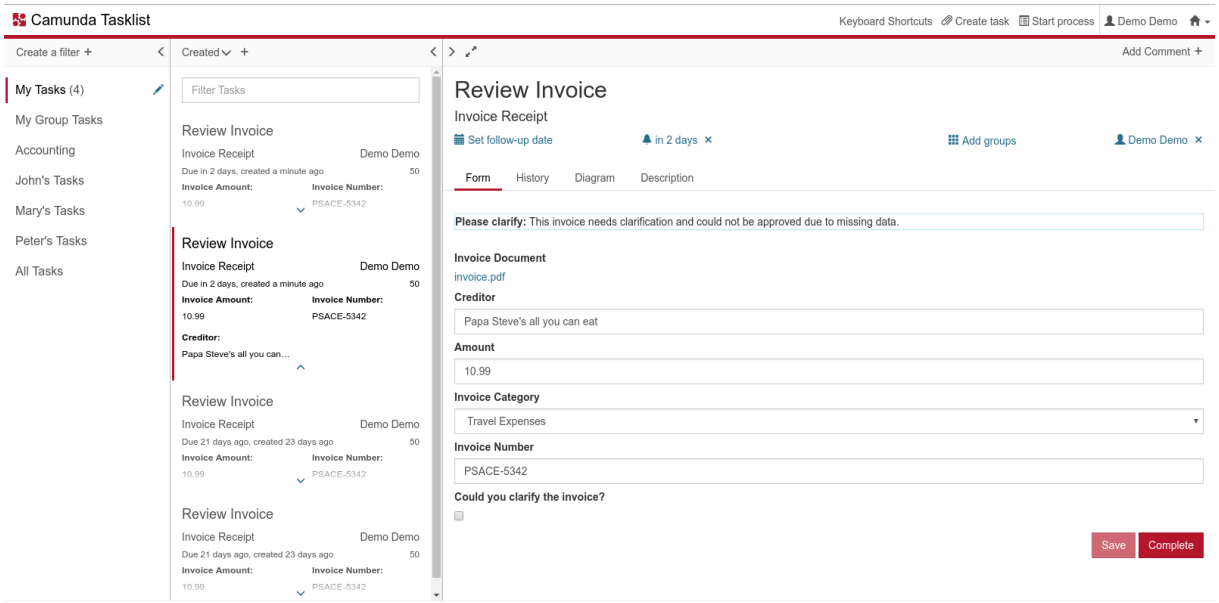


Camunda: Structure according to the WfMC reference model

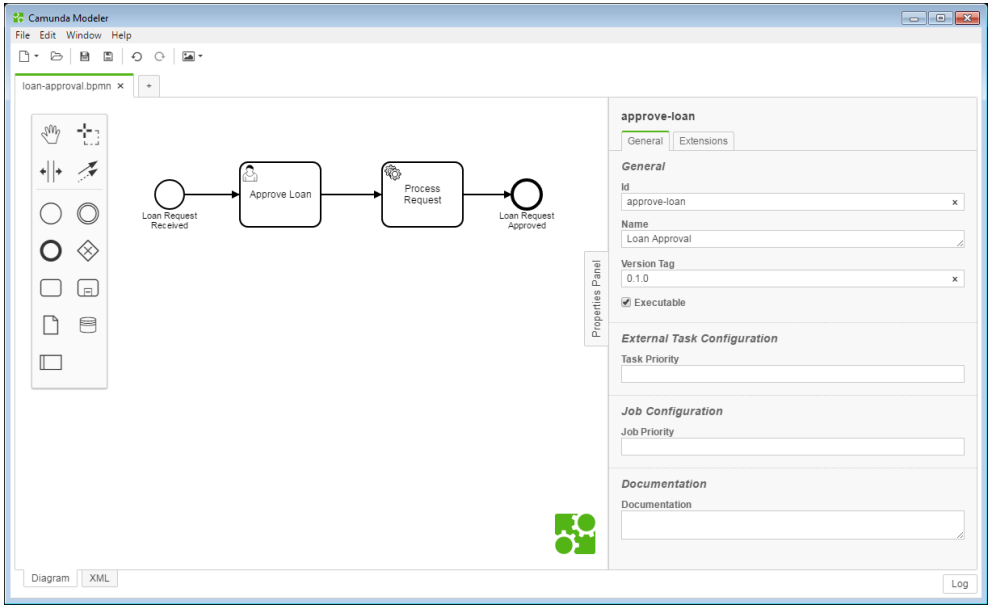


Camunda Tasklist

- Generic Client to claim tasks generated from the process
- Start processes



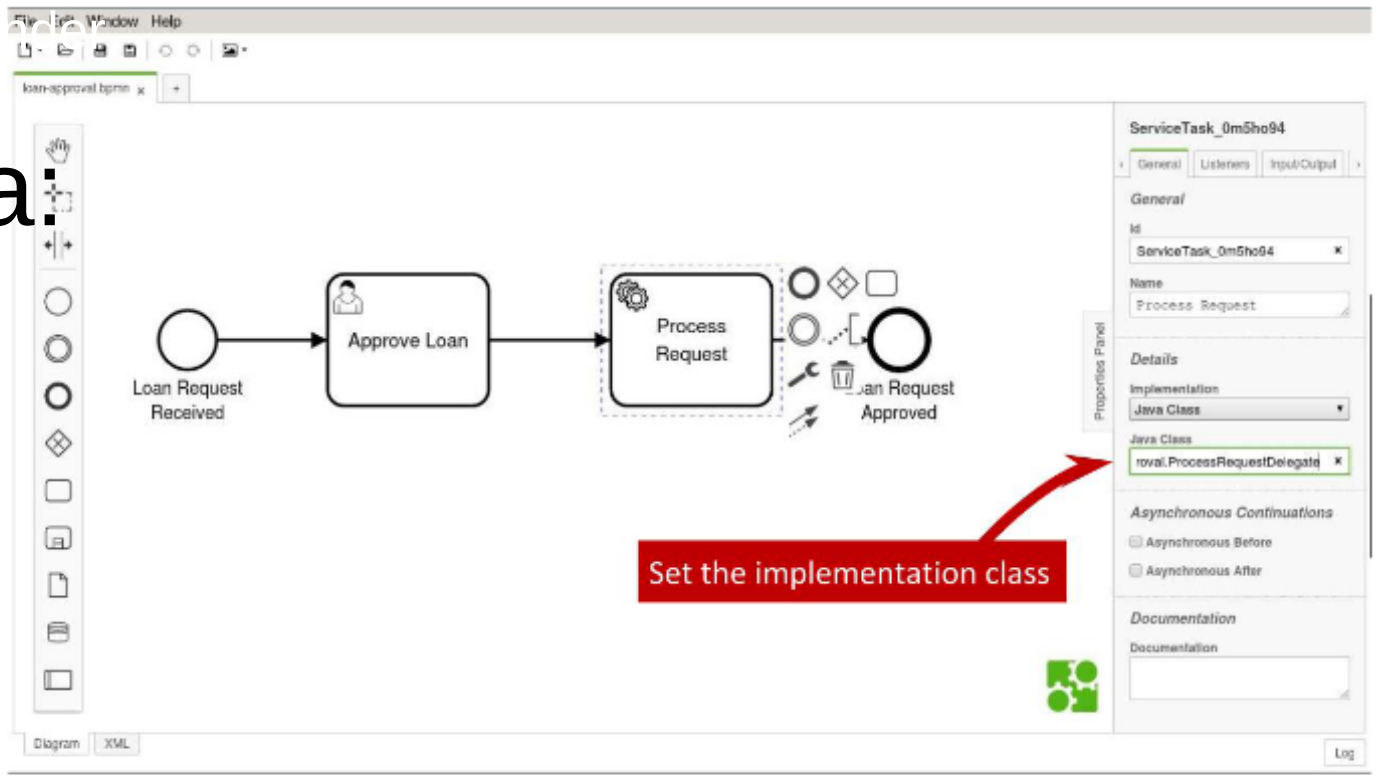
Camunda: getting started



Steps:

- Download + Install (done in the LVIS)
- Create a project
- Model a simple process using BPMN 2.0 (https://docs.camunda.org/get-started/bpmn20/) or take one modeled in Signavio (https://docs.camunda.org/get-started/cycle/roundtrip-signavio/)
- Deploy to Camunda Engine + Test
- [Extend by HTML-Forms
- Extend by Custom Java Code]

Camunda: Java Method Calls



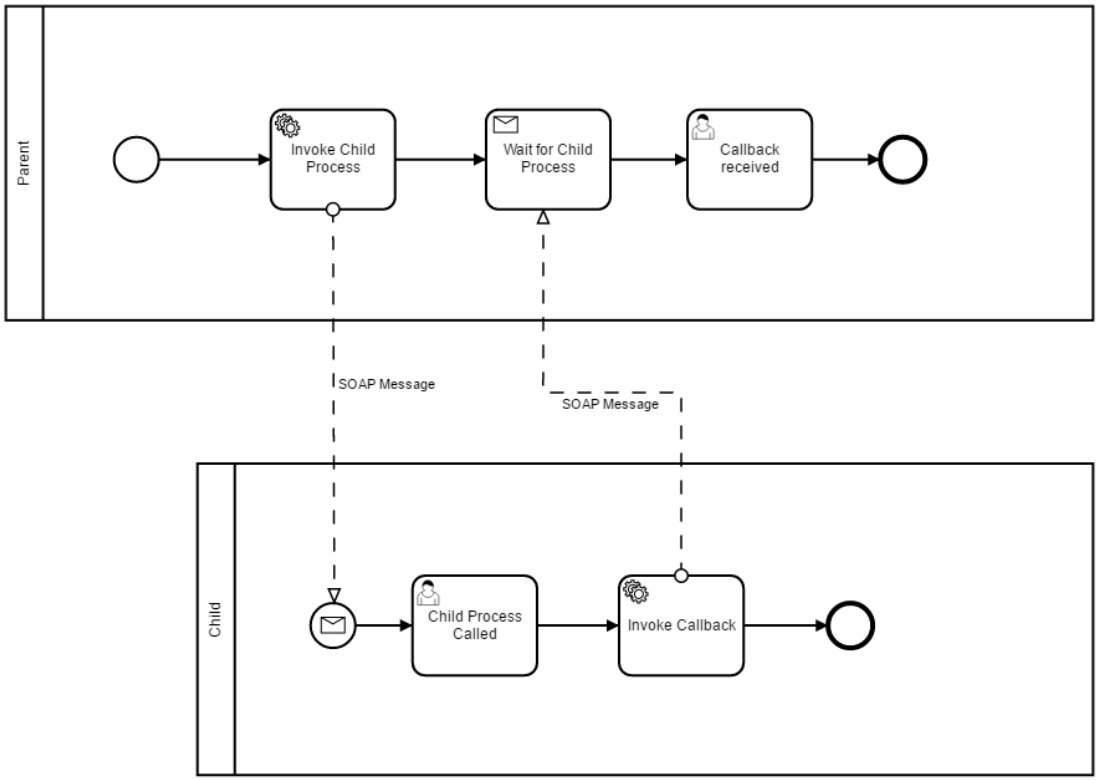

```
package org.camunda.bpm.getstarted.loanapproval;

import java.util.logging.Logger;
import org.camunda.bpm.engine.delegate.DelegateExecution;
import org.camunda.bpm.engine.delegate.JavaDelegate;

public class ProcessRequestDelegate implements JavaDelegate {
        private final static Logger LOGGER = Logger.getLogger("LOAN-REQUESTS");

        public void execute(DelegateExecution execution) throws Exception {
                LOGGER.info("Processing request by '" +
                        execution.getVariable("customerId") + "'...");
```

Camunda: WS-SOAP-based Web Service Invocation



Camunda: WS-SOAP-based Web Service Invocation (2)

```
@WebService(name = "ProcessInvocationService")
public class ProcessInvocation {
  public static final String CALLBACK_URL = "callbackURL";
  public static final String CALLBACK_CORRELATION_ID = "callbackCorrelationId";
  public static final String PAYLOAD = "payload";

  @Inject
  private RuntimeService runtimeService;

  public void invokeProcess(String processDefinitionKey, String callbackUrl, String
correlationId, String payload) {
    Map<String, Object> variables = new HashMap<String, Object>();
    variables.put(CALLBACK_URL, callbackUrl);
    variables.put(CALLBACK_CORRELATION_ID, correlationId);
    variables.put(PAYLOAD, payload);
    runtimeService.startProcessInstanceByKey(processDefinitionKey, variables);
  }
```

Camunda: Integrating Web Service Invocation into the Process

Parent.bpmn

```
<serviceTask id="ServiceTask_1"
activiti:expression="#{processInvocationClient.invokeProcess('inter-process-communication-ws-child', execution)}" name="Invoke child process" />
```

Child.bpmn

```
<serviceTask id="ServiceTask_1"
activiti:expression="#{processCallbackClient.invokeProcessCallback(payload, execution)};" name="Invoke callback">
```

Camunda: Web Service Invocation Code Example

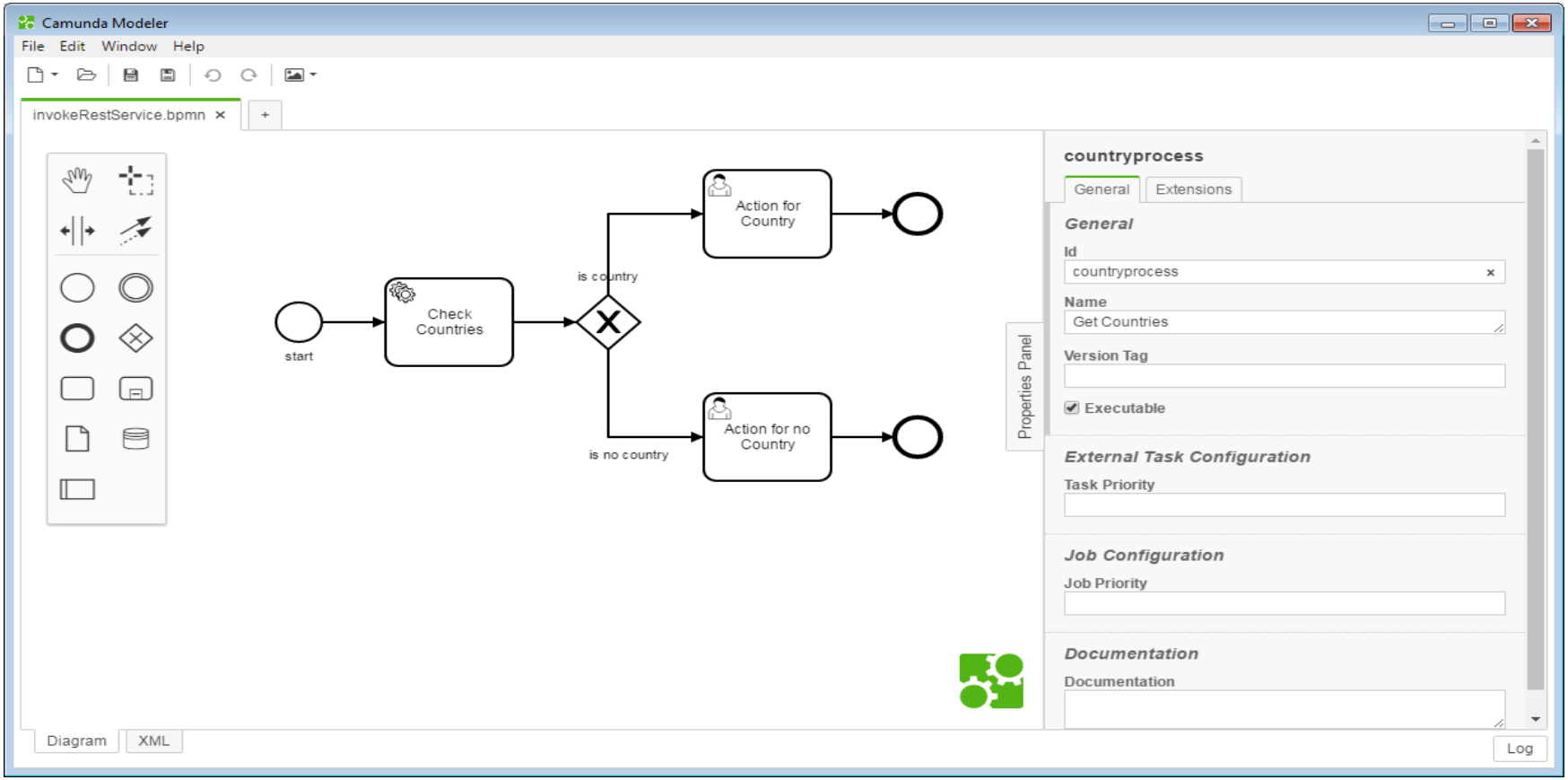
```
@Named
public class ProcessInvocationClient {

  public static final String CORRELATION_ID_PREFIX = "correlationIdForInvocationOf_";
  public static final String SAMPLE_PAYLOAD_PREFIX = "sample-payload-";

  @Inject
  ServiceRegistry serviceRegistry;

  public void invokeProcess(String processDefinitionKey, DelegateExecution execution) {
    // lookup service URL
    URL wsdlLocation = serviceRegistry.getWsdlLocation(processDefinitionKey);
    // prepare CXF client
    ProcessInvocationService service = new ProcessInvocationService_Service(wsdlLocation)
        .getProcessInvocationServicePort();
    // generate callback URL and correlation ID
    String callbackUrl = serviceRegistry.getWsdlLocation("inter-process-communication-ws-parent").toString();
    String correlationId = UUID.randomUUID().toString();
    // store correlation ID
    execution.setVariable(CORRELATION_ID_PREFIX + processDefinitionKey, correlationId);
    // call service
    service.invokeProcess(processDefinitionKey, callbackUrl , correlationId, SAMPLE_PAYLOAD_PREFIX + correlationId);
  }
}
```

Camunda: ReSTful Web Service Invocation



Camunda: ReSTful Web Service Invocation

```
public class ProcessRequestDelegate implements JavaDelegate {
        private final static Logger LOGGER = Logger.getLogger("LOAN-REQUESTS");
        public void execute(DelegateExecution execution) throws Exception {
                LOGGER.info("Processing request by '" + execution.getVariable(„authorId") + "'...");
                HttpClient vClient=HttpClient.newBuilder()
                .connectTimeout(Duration.ofSeconds(20))
                .followRedirects(Redirect.NORMAL).version(Version.HTTP_1_1).build();
                HttpRequest vRequest=HttpRequest.newBuilder()
                .headers("Content-Type", "application/json").timeout(Duration.ofSeconds(20))
                .uri(URI.create(aBaseUri+sAuthorsResourcePath+"/"+vAuthorId.toString()))
                .build();
                try {
                        HttpResponse<String> vResponse=vClient.send(vRequest,
BodyHandlers.ofString());
                        if(vResponse.statusCode()==HttpServletResponse.SC_NOT_FOUND) {
                                execution.setVariable(„authorData“, null);}
                        else {execution.setVariable(„authorData“, vResponse.body()));}
}               catch (IOException | InterruptedException e) {
                        execution.setVariable(„authorData“, null);
                }
        }
}
```

Summary

- ✓ Camunda background presented
- ✓ Camunda module structure according to the WfMC schema explained
- ✓ Camunda workflow modeling incl. WS-SOAP-based and ReSTful Web Service usage explained in examples

Questions? Questions!

THANK YOU VERY MUCH FOR YOUR ATTENTION!