ModelTalk: A Framework for Developing Domain Specific Executable Models

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PONTIS

Agenda

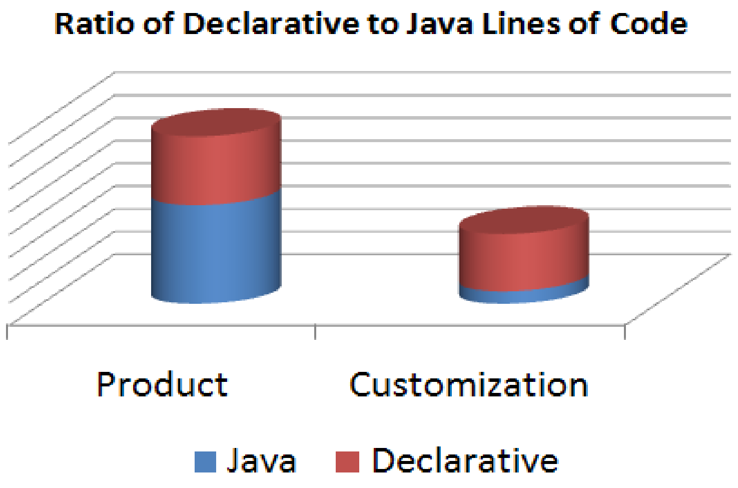
- Introduction
- ModelTalk Facts
- The ModelTalk Approach
- Model-Driven Dependency Injection
- Product-Line Architecture
- ModelTalk in Action
- Conclusion

The Challenge: Telco-grade Dependability with Extreme Agility

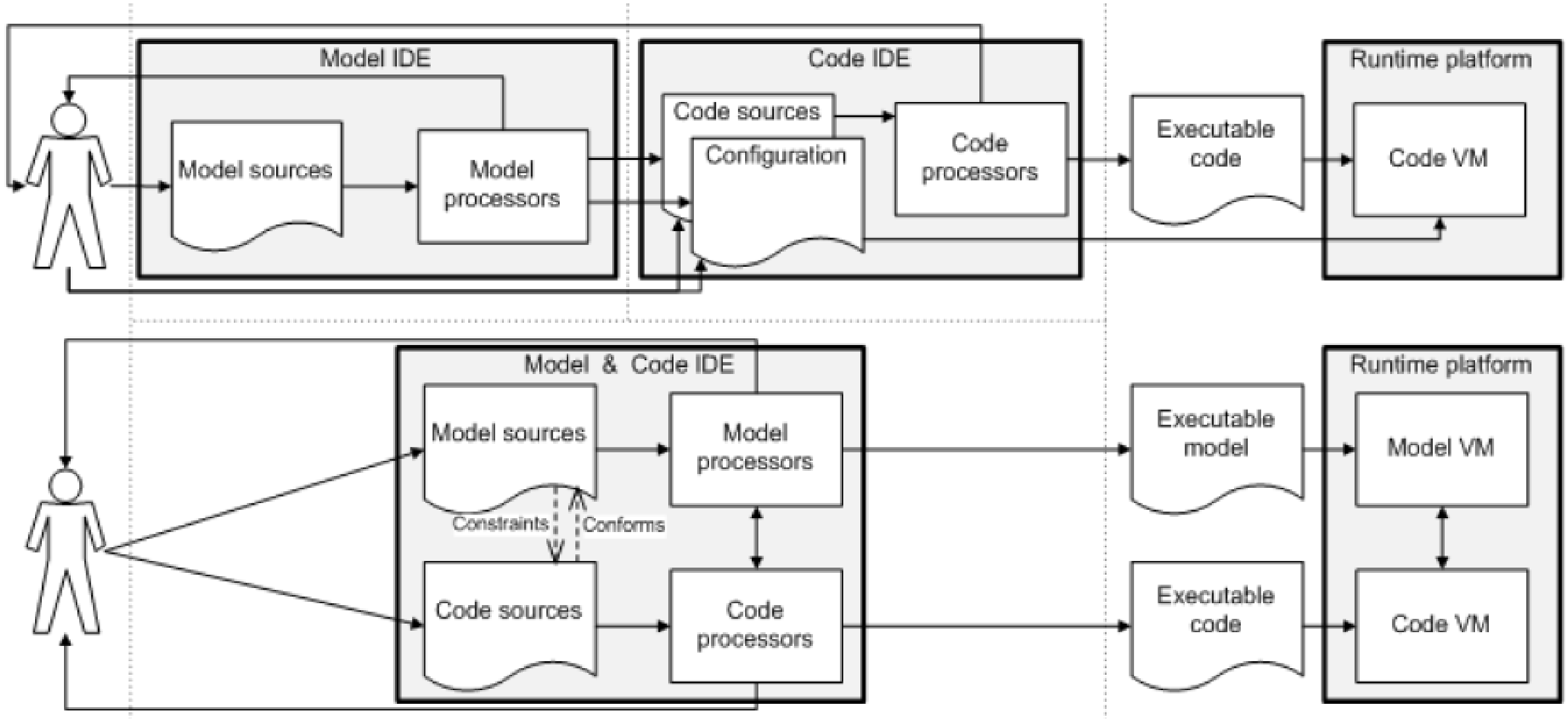
- **Telecommunications** Business Support System (BSS)
  - Customers: Communication service providers
  - Product: Marketing delivery platform
- **Problem Space**
  - Strict extra-functional requirements
  - Pervasive customization
  - Frequent updates
- **Solution Space**
  - Third-party components (Main-stream J2EE technologies)
  - Domain-specific model-driven development
  - Product-line software engineering

ModelTalk Facts

- **Interpretive Approach**
  - Short edit-execute cycle
  - Minimum changes to binary code
- **Commercial Experience**
  - 30 developers; >15 systems
  - 50 TPS/CPU.
  - Response time:
    70 ms average,
    250 ms 99%
- **Customization**
  - Time and effort dropped by an order of magnitude
  - 82% declarative

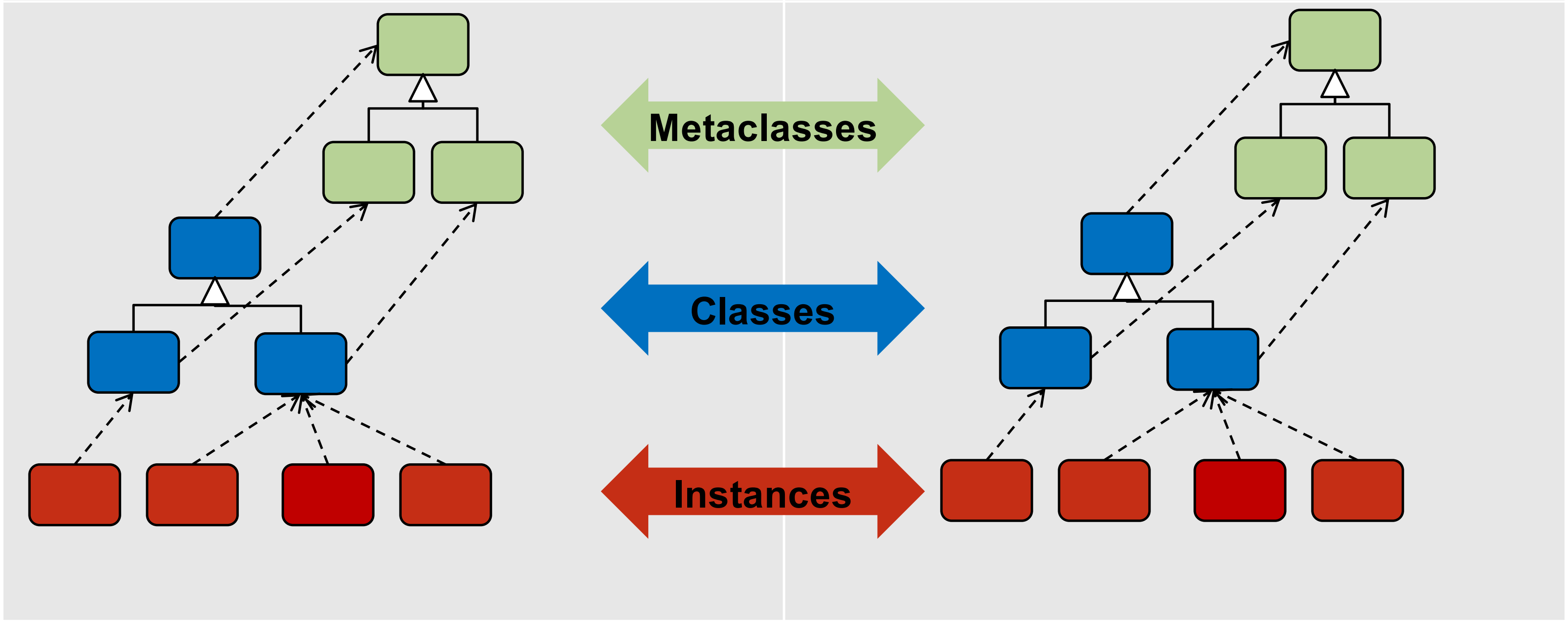


The ModelTalk Approach (1/4)



The ModelTalk Approach (2/4)

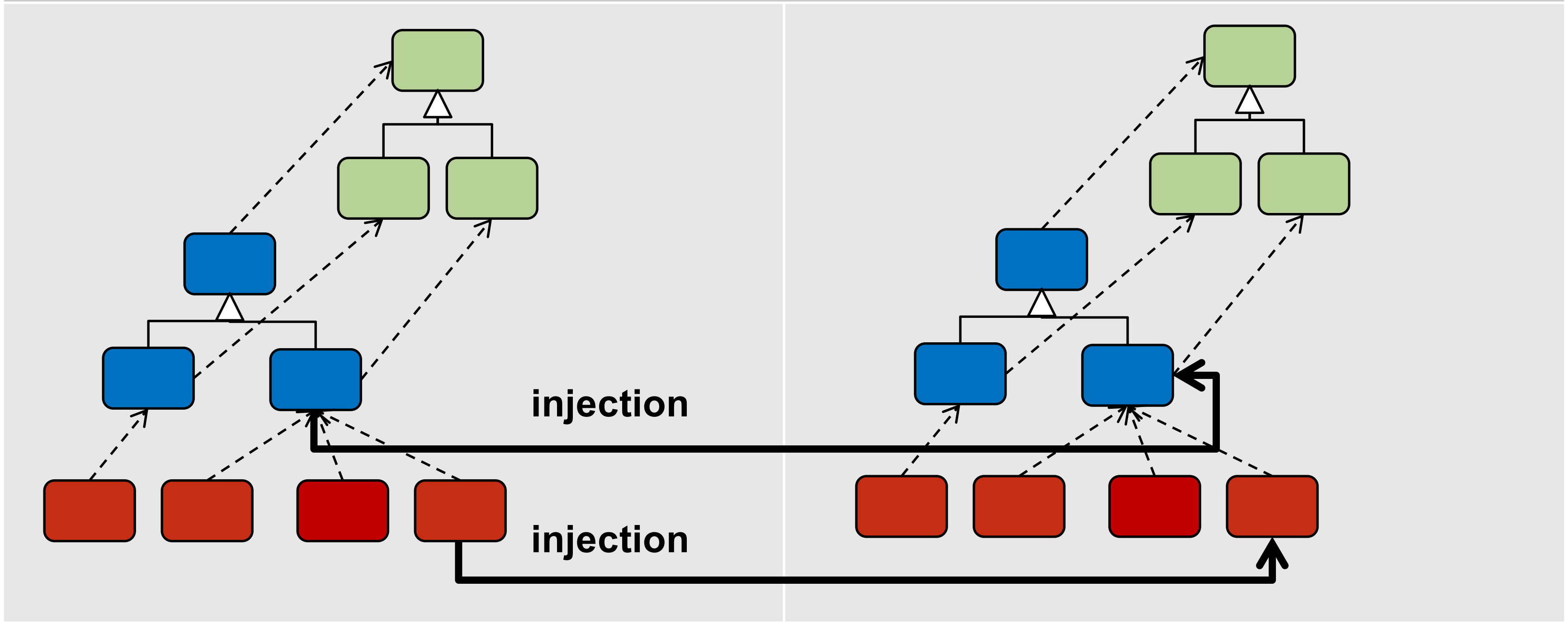
Model (XML)	Code (Java)
- Structure and static state - Instances, Classes, Meta-classes	- Behavior - ModelTalk managed Java classes



The ModelTalk Approach (3/4)

ModelTalk Dependency Injection

Model (XML)	Code (Java)
- Model Driven Dependency Injection - Model instances are constructed and injected into Java instances	

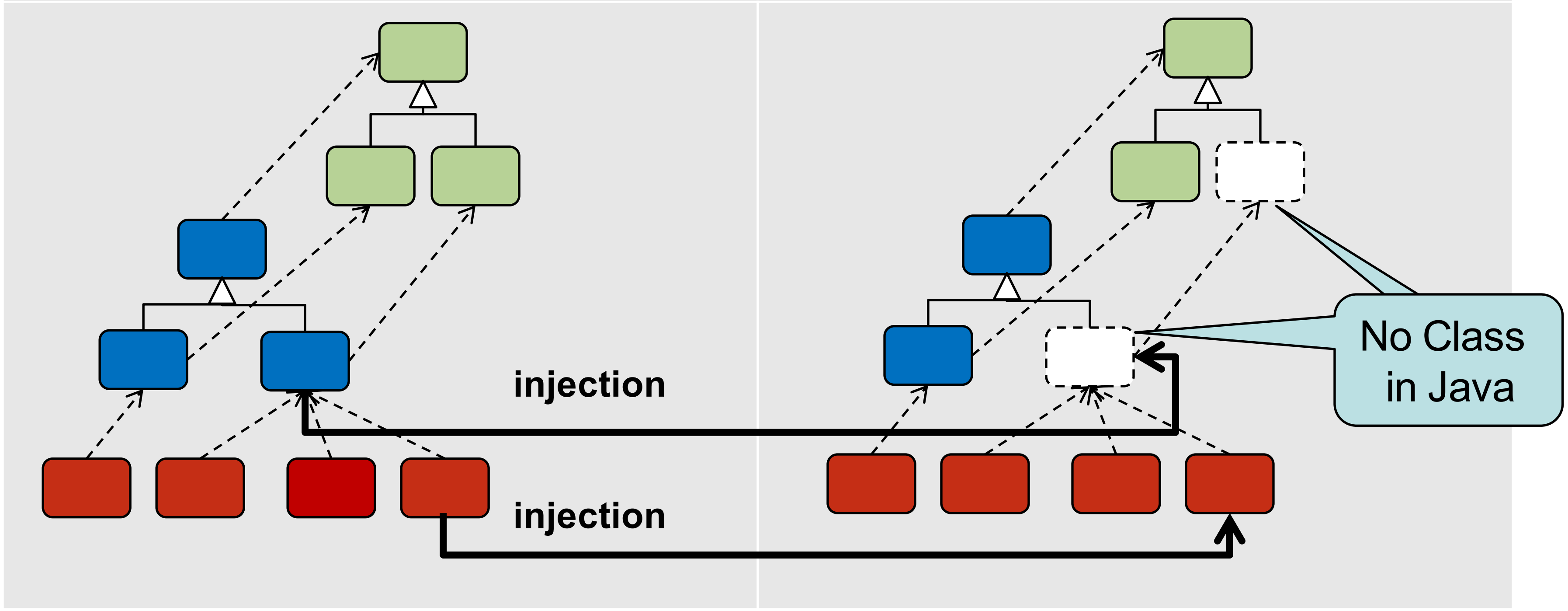


The ModelTalk Approach (4/4)

ModelTalk Adaptability

Model (XML)	Code (Java)

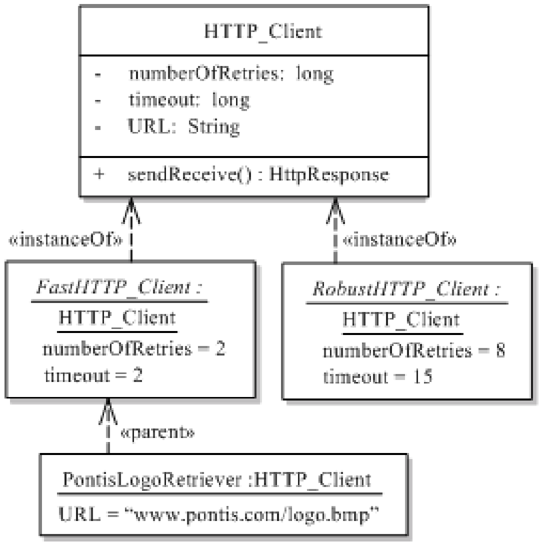
- Mapping permits "holes" on the Java side
- Holes enable Java-less model change process



Model-Driven Dependency Injection (1/3)

Simple Beans

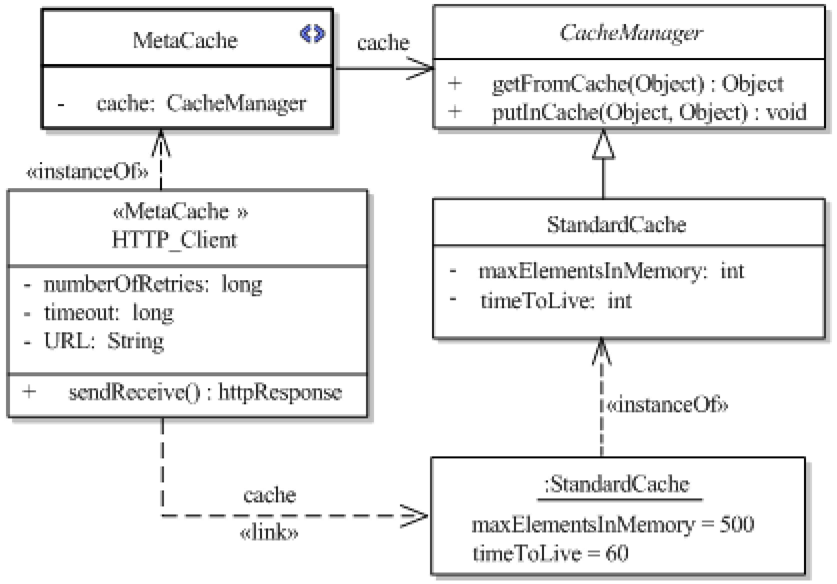
```java
public class HTTP_Client {
  private long numberOfRetries = 0;
  private long timeout = 0;
  private String URL = null;

  public void setNumberOfRetries(long number){
    this.numberOfRetries = number;
  }

  public void setTimeout(long timeout){
    this.timeout = timeout;
  }

  public void setURL(String URL){
    this.URL = URL;
  }

  public HttpResponse sendReceive(){
    HttpResponse result = null;
    // business logic
    return result;
  }
}
```



```xml
<bean id="HTTP_Client" class="Class">
  <properties>
    <property>
      <name>numberOfRetries</name>
      <type>Long</type>
      <description>Number of retries</description>
    </property>
    <property>
      <name>timeout</name>
      <type>Long</type>
      <description>Timeout in seconds</description>
    </property>
    <property>
      <name>URL</name>
      <type>String</type>
      <description>The target URL</description>
    </property>
  </properties>
</bean>
<bean id="RobustHTTP_Client" class="HTTP_Client"
  abstract="true">
  <numberOfRetries>8</timeout>
    <timeout>15</timeout>
</bean>
<bean id="FastHTTP_Client" class="HTTP_Client"
  abstract="true">
  <numberOfRetries>2</timeout>
    <timeout>2</timeout>
</bean>
<bean id="PontisLogoRetriever" class="HTTP_Client"
  parent="FastHTTP_Client">
  <URL>www.pontis.com/logo.bmp</URL>
</bean>
```

Model-Driven Dependency Injection (2/3)

Metaclass Constraints

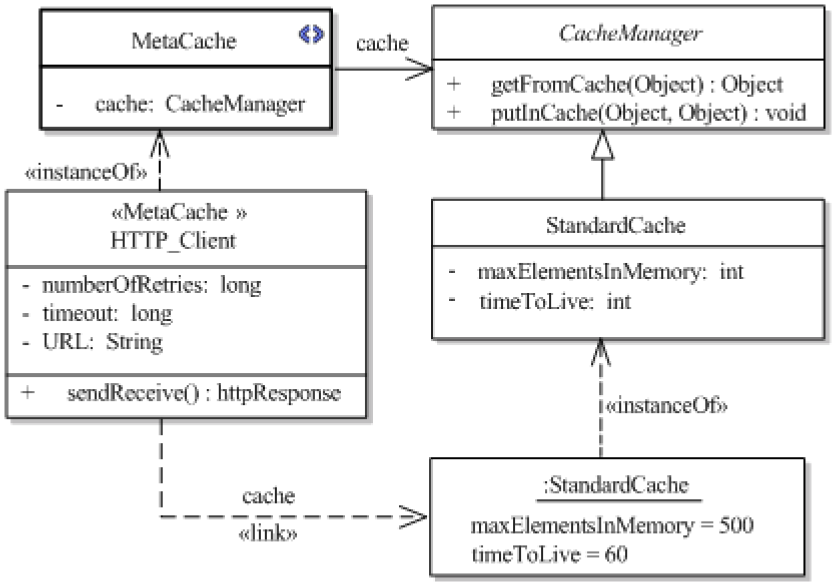


```
<bean id="MetaCache" class="Class" parent="Class">
   <properties>
      <property>
         <name>cache</name>
         <type>CacheManager</type>
         <description>Caches the result</description>
      </property>
   </properties>
</bean>
<bean id="HTTP_Client" class="MetaCache">
   <cache class="StandardCache">
      <timeToLive>60</timeToLive>
      <maxElementsInMemory>500</maxElementsInMemory>
   </cache>
   <properties>
      …
   </properties>
</bean>
```

```
public HttpResponse sendReceive() {
  MetaCache myMetaclass =(MetaCache)Kernel.instance().getClass(this);
  HttpResponse result = myMetaclass.getCache().getFromCache(getURL());
  if (result == null) {
    // do the business logic using timeout & numberOfRetries
    myMetaclass.getCache().putInCache(getURL(), result);
  }
  return result;
}
```

Model-Driven Dependency Injection (3/3)

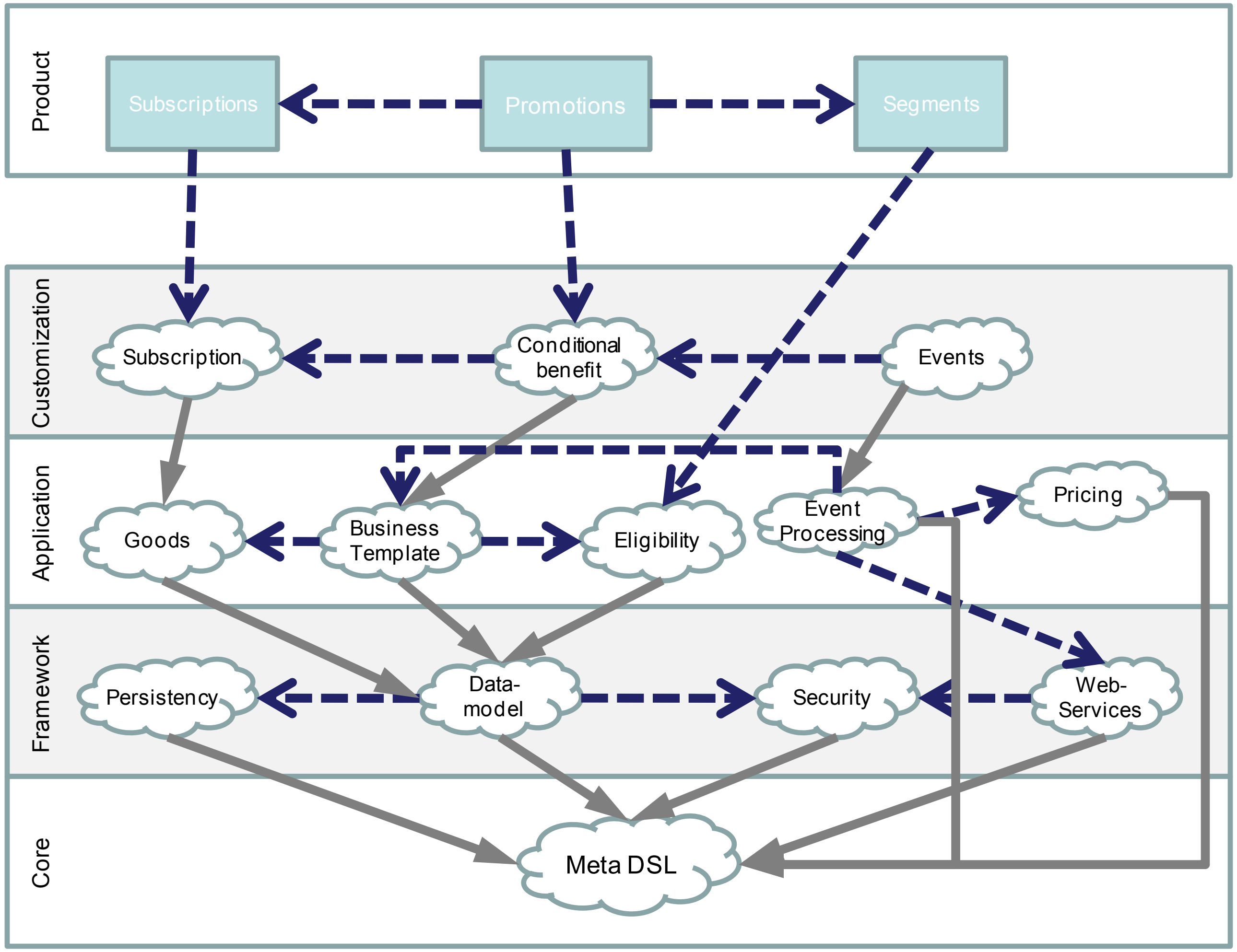
Variation by composition



```
<bean id="BankBalanceClient" class="MetaSecuredCache"
        parent="HTTP_Client">
   <cache class="SecuredCache">
      <publicKey>kkkkkk</publicKey>
      <timeToLive>60</timeToLive>
      <maxElementsInMemory>500</maxElementsInMemory>
   </cache>
   <properties>
      …
   </properties>
</bean>

<bean id="StockQuoteClient" class="MetaCache" parent="HTTP_Client">
   <cache class="NoCache">
   </cache>
   <properties>
      …
   </properties>
</bean>

<bean id="FastHTTP_Client" class="HTTP_Client" abstract="true">
   <numberOfRetries>2</timeout>
      <timeout>2</timeout>
</bean>

<bean id="NasdaqStockQuoteRetriever" class="StockQuoteClient "
        parent="FastHTTP_Client" >
   <URL>www.nasdaq.com/…</URL>
</bean>
```

Product-Line Architecture 1/2

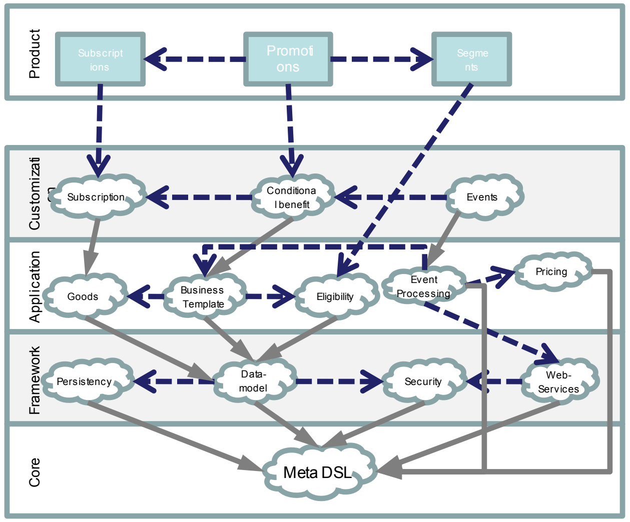
Everything is A DSL



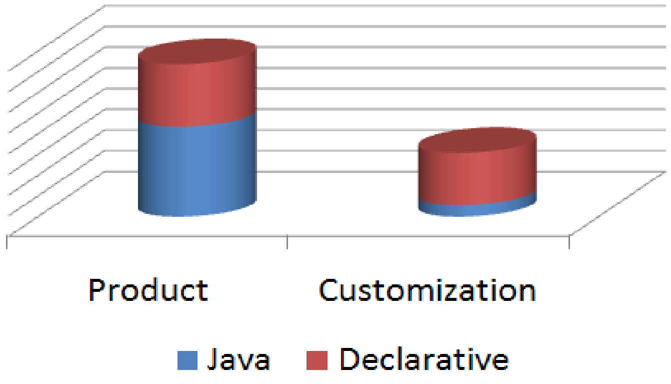
Product-Line Architecture

Everything is A DSL

- DSLs expose a known variability of an imperative framework to the user.
- Developers create DSLs for other developers.
- Composition of DSLs in order to build high level DSLs and to reuse the lower level DSLs
- The final product is built from numerous high level DSLs allowing the marketer to define his business scenarios.



Ratio of Declarative to Java Lines of Code



ModelTalk in Action

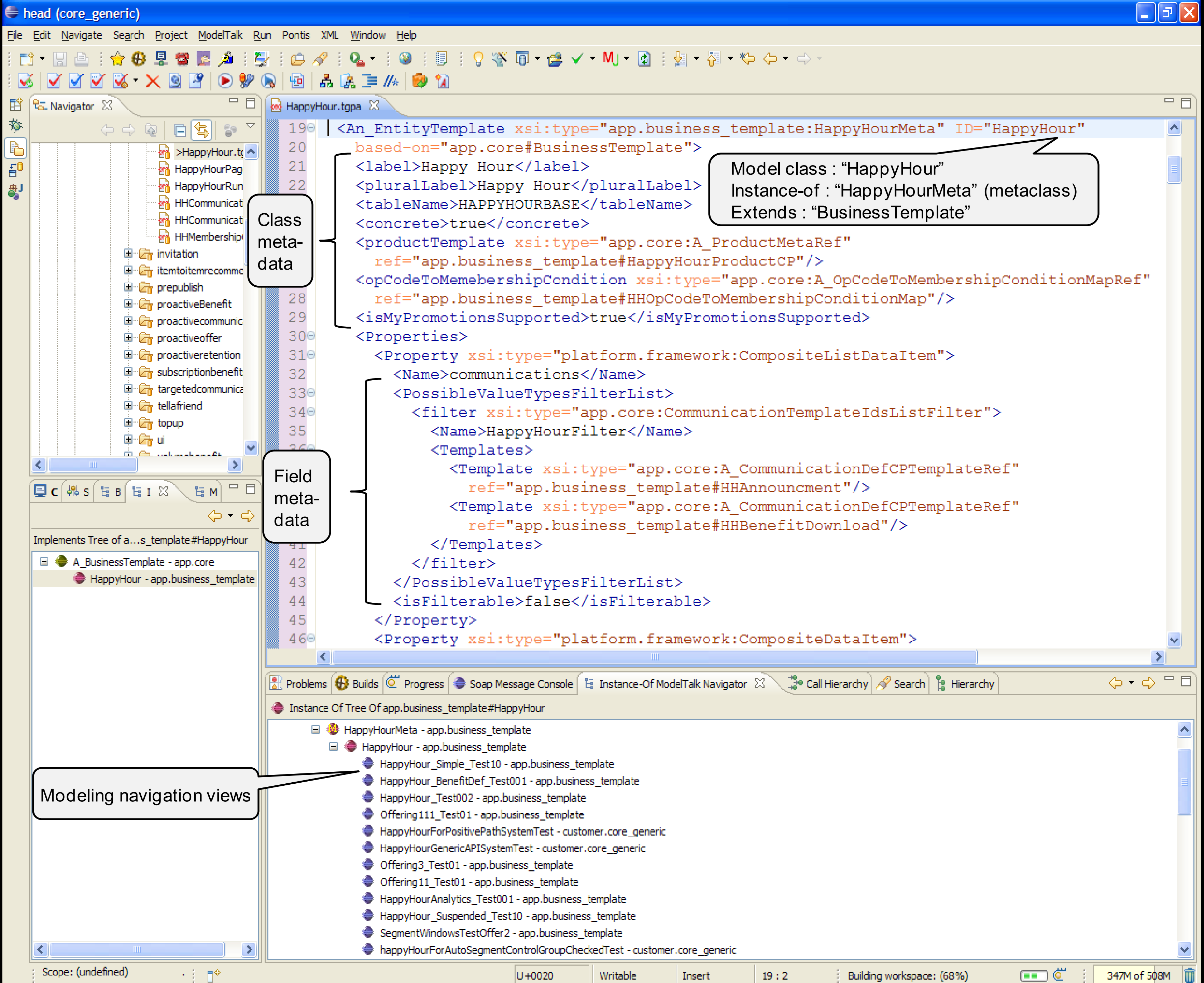
- **Objective**
  - Look and feel of the ModelTalk IDE
- **Example**
  - Customizing the Pontis application for OOPSLA in less than 10 minutes…
  - OOPSLA Happy Hour promotion
    - **$20 discount on selected OOPSLA tutorials during Oct 19-20, 2008.**

Demo: Edit-Execute Cycle (1/2)

Part I: By a Programmer

- Create a HappyHour instance
- Add the HappyHour instance to the DB
- Customize UI labels
- Options
- Manipulate the HappyHour instance in the GUI

Model-Code IDE → Easier assimilation
Model-compilation → Controlled declarative changes
Meta-object extensibility → Meta-Data = Data


head (core_generic)
File Edit Navigate Search Project ModelTalk Run Pontis XML Window Help
Navigator
HappyHour.tgpa
Class meta-data
Model class : “HappyHour”
Instance-of : “HappyHourMeta” (metaclass)
Extends : “BusinessTemplate”
Field meta-data
Modeling navigation views
Problems Builds Progress Soap Message Console Instance-Of ModelTalk Navigator Call Hierarchy Search Hierarchy

```
<An_EntityTemplate xsi:type="app.business_template:HappyHourMeta" ID="HappyHour"
  based-on="app.core#BusinessTemplate">
  <label>Happy Hour</label>
  <pluralLabel>Happy Hour</pluralLabel>
  <tableName>HAPPYHOURBASE</tableName>
  <concrete>true</concrete>
  <productTemplate xsi:type="app.core:A_ProductMetaRef"
    ref="app.business_template#HappyHourProductCP"/>
  <opCodeToMemebershipCondition xsi:type="app.core:A_OpCodeToMembershipConditionMapRef"
    ref="app.business_template#HHOpCodeToMembershipConditionMap"/>
  <isMyPromotionsSupported>true</isMyPromotionsSupported>
  <Properties>
    <Property xsi:type="platform.framework:CompositeListDataItem">
      <Name>communications</Name>
      <PossibleValueTypesFilterList>
        <filter xsi:type="app.core:CommunicationTemplateIdsListFilter">
          <Name>HappyHourFilter</Name>
          <Templates>
            <Template xsi:type="app.core:A_CommunicationDefCPTemplateRef"
              ref="app.business_template#HHAnnouncment"/>
            <Template xsi:type="app.core:A_CommunicationDefCPTemplateRef"
              ref="app.business_template#HHBenefitDownload"/>
          </Templates>
        </filter>
      </PossibleValueTypesFilterList>
      <isFilterable>false</isFilterable>
    </Property>
    <Property xsi:type="platform.framework:CompositeDataItem">
```

>HappyHour.t
HappyHourPag
HappyHourRun
HHCommunicat
HHCommunicat
HHMembership
invitation
itemtoitemrecomme
prepublish
proactiveBenefit
proactivecommunic
proactiveoffer
proactiveretention
subscriptionbenefit
targetedcommunic
tellafriend
topup
ui

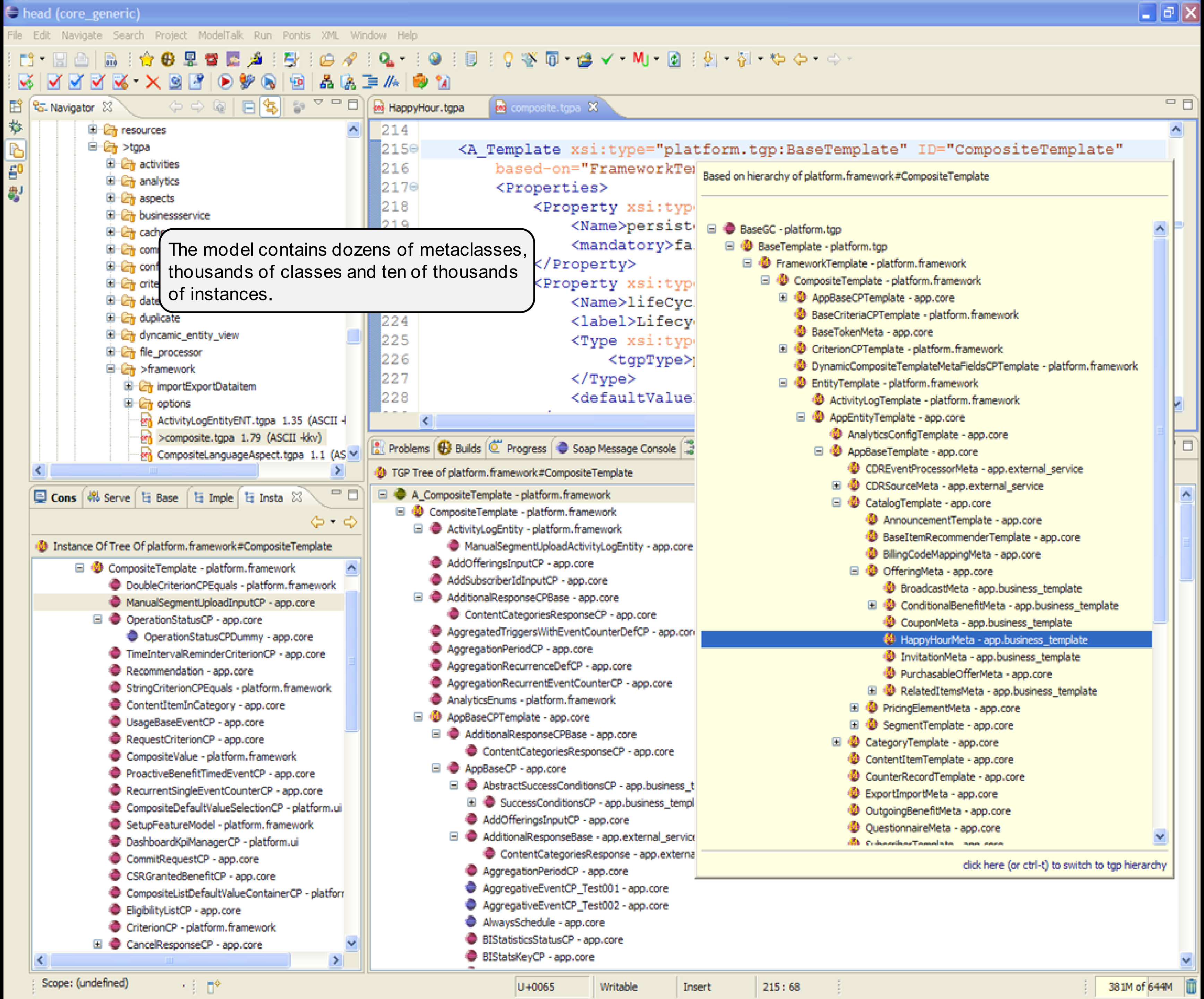
Implements Tree of a…s_template#HappyHour

- A_BusinessTemplate - app.core
  - HappyHour - app.business_template

Instance Of Tree Of app.business_template#HappyHour

- HappyHourMeta - app.business_template
  - HappyHour - app.business_template
    - HappyHour_Simple_Test10 - app.business_template
    - HappyHour_BenefitDef_Test001 - app.business_template
    - HappyHour_Test002 - app.business_template
    - Offering111_Test01 - app.business_template
    - HappyHourForPositivePathSystemTest - customer.core_generic
    - HappyHourGenericAPISystemTest - customer.core_generic
    - Offering3_Test01 - app.business_template
    - Offering11_Test01 - app.business_template
    - HappyHourAnalytics_Test001 - app.business_template
    - HappyHour_Suspended_Test10 - app.business_template
    - SegmentWindowsTestOffer2 - app.business_template
    - happyHourForAutoSegmentControlGroupCheckedTest - customer.core_generic

Scope: (undefined) U+0020 Writable Insert 19 : 2 Building workspace: (68%) 347M of 508M



The model contains dozens of metaclasses, thousands of classes and ten of thousands of instances.

head (core_generic)

File Edit Navigate Search Project ModelTalk Run Pontis XML Window Help

Navigator

```
resources
>tgpa
  activities
  analytics
  aspects
  businessservice
  cach
  com
  conf
  crite
  date
  duplicate
  dyncamic_entity_view
  file_processor
  >framework
    importExportDataitem
    options
    ActivityLogEntityENT.tgpa 1.35 (ASCII -
    >composite.tgpa 1.79 (ASCII -kkv)
    CompositeLanguageAspect.tgpa 1.1 (AS
```

HappyHour.tgpa | composite.tgpa

```
  <A_Template xsi:type="platform.tgp:BaseTemplate" ID="CompositeTemplate"
    based-on="FrameworkTe
    <Properties>
      <Property xsi:typ
        <Name>persist
        <mandatory>fa
      </Property>
      <Property xsi:typ
        <Name>lifeCyc
        <label>Lifecy
        <Type xsi:typ
          <tgpType>
        </Type>
        <defaultValue
```

Based on hierarchy of platform.framework#CompositeTemplate

```
BaseGC - platform.tgp
  BaseTemplate - platform.tgp
    FrameworkTemplate - platform.framework
      CompositeTemplate - platform.framework
        AppBaseCPTemplate - app.core
        BaseCriteriaCPTemplate - platform.framework
        BaseTokenMeta - app.core
        CriterionCPTemplate - platform.framework
        DynamicCompositeTemplateMetaFieldsCPTemplate - platform.framework
        EntityTemplate - platform.framework
          ActivityLogTemplate - platform.framework
          AppEntityTemplate - app.core
            AnalyticsConfigTemplate - app.core
            AppBaseTemplate - app.core
              CDREventProcessorMeta - app.external_service
              CDRSourceMeta - app.external_service
              CatalogTemplate - app.core
                AnnouncementTemplate - app.core
                BaseItemRecommenderTemplate - app.core
                BillingCodeMappingMeta - app.core
                OfferingMeta - app.core
                  BroadcastMeta - app.business_template
                  ConditionalBenefitMeta - app.business_template
                  CouponMeta - app.business_template
                  HappyHourMeta - app.business_template
                  InvitationMeta - app.business_template
                  PurchasableOfferMeta - app.core
                  RelatedItemsMeta - app.business_template
                PricingElementMeta - app.core
                SegmentTemplate - app.core
              CategoryTemplate - app.core
              ContentItemTemplate - app.core
              CounterRecordTemplate - app.core
              ExportImportMeta - app.core
              OutgoingBenefitMeta - app.core
              QuestionnaireMeta - app.core
```

click here (or ctrl-t) to switch to tgp hierarchy

Problems | Builds | Progress | Soap Message Console

TGP Tree of platform.framework#CompositeTemplate

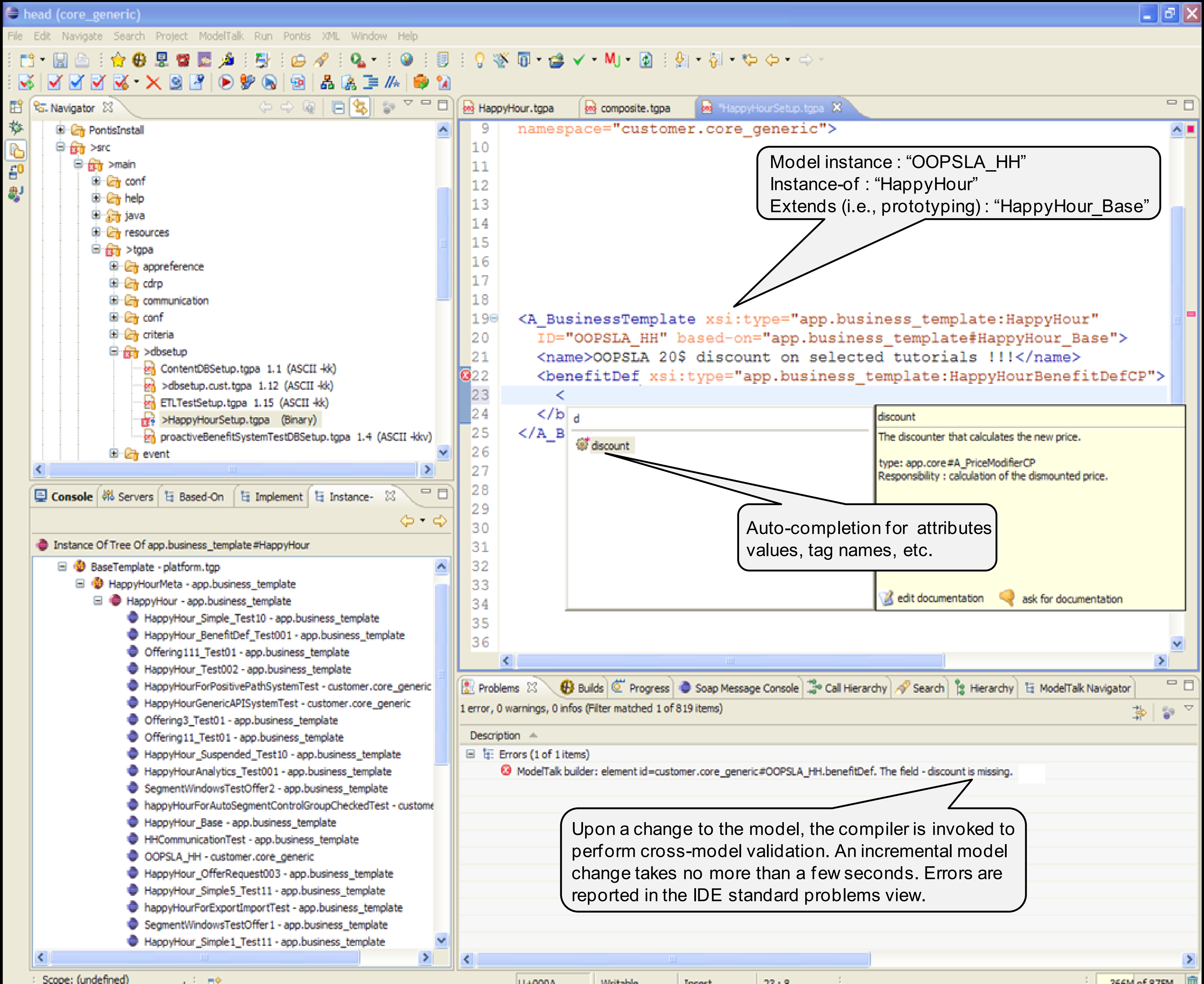
```
A_CompositeTemplate - platform.framework
  CompositeTemplate - platform.framework
    ActivityLogEntity - platform.framework
      ManualSegmentUploadActivityLogEntity - app.core
    AddOfferingsInputCP - app.core
    AddSubscriberIdInputCP - app.core
    AdditionalResponseCPBase - app.core
      ContentCategoriesResponseCP - app.core
    AggregatedTriggersWithEventCounterDefCP - app.core
    AggregationPeriodCP - app.core
    AggregationRecurrenceDefCP - app.core
    AggregationRecurrentEventCounterCP - app.core
    AnalyticsEnums - platform.framework
    AppBaseCPTemplate - app.core
      AdditionalResponseCPBase - app.core
        ContentCategoriesResponseCP - app.core
      AppBaseCP - app.core
        AbstractSuccessConditionsCP - app.business_t
          SuccessConditionsCP - app.business_templ
        AddOfferingsInputCP - app.core
        AdditionalResponseBase - app.external_service
          ContentCategoriesResponse - app.externa
        AggregationPeriodCP - app.core
        AggregativeEventCP_Test001 - app.core
        AggregativeEventCP_Test002 - app.core
        AlwaysSchedule - app.core
        BIStatisticsStatusCP - app.core
        BIStatsKeyCP - app.core
```

Cons | Serve | Base | Imple | Insta

Instance Of Tree Of platform.framework#CompositeTemplate

```
CompositeTemplate - platform.framework
  DoubleCriterionCPEquals - platform.framework
  ManualSegmentUploadInputCP - app.core
  OperationStatusCP - app.core
    OperationStatusCPDummy - app.core
  TimeIntervalReminderCriterionCP - app.core
  Recommendation - app.core
  StringCriterionCPEquals - platform.framework
  ContentItemInCategory - app.core
  UsageBaseEventCP - app.core
  RequestCriterionCP - app.core
  CompositeValue - platform.framework
  ProactiveBenefitTimedEventCP - app.core
  RecurrentSingleEventCounterCP - app.core
  CompositeDefaultValueSelectionCP - platform.ui
  SetupFeatureModel - platform.framework
  DashboardKpiManagerCP - platform.ui
  CommitRequestCP - app.core
  CSRGrantedBenefitCP - app.core
  CompositeListDefaultValueContainerCP - platforr
  EligibilityListCP - app.core
  CriterionCP - platform.framework
  CancelResponseCP - app.core
```

Scope: (undefined) | U+0065 | Writable | Insert | 215 : 68 | 381M of 644M


head (core_generic)
File Edit Navigate Search Project ModelTalk Run Pontis XML Window Help
Navigator
PontisInstall
>src
>main
conf
help
java
resources
>tgpa
appreference
cdrp
communication
conf
criteria
>dbsetup
ContentDBSetup.tgpa 1.1 (ASCII -kk)
>dbsetup.cust.tgpa 1.12 (ASCII -kk)
ETLTestSetup.tgpa 1.15 (ASCII -kk)
>HappyHourSetup.tgpa (Binary)
proactiveBenefitSystemTestDBSetup.tgpa 1.4 (ASCII -kkv)
event
Console
Servers
Based-On
Implement
Instance-
Instance Of Tree Of app.business_template#HappyHour
BaseTemplate - platform.tgp
HappyHourMeta - app.business_template
HappyHour - app.business_template
HappyHour_Simple_Test10 - app.business_template
HappyHour_BenefitDef_Test001 - app.business_template
Offering111_Test01 - app.business_template
HappyHour_Test002 - app.business_template
HappyHourForPositivePathSystemTest - customer.core_generic
HappyHourGenericAPISystemTest - customer.core_generic
Offering3_Test01 - app.business_template
Offering11_Test01 - app.business_template
HappyHour_Suspended_Test10 - app.business_template
HappyHourAnalytics_Test001 - app.business_template
SegmentWindowsTestOffer2 - app.business_template
happyHourForAutoSegmentControlGroupCheckedTest - custome
HappyHour_Base - app.business_template
HHCommunicationTest - app.business_template
OOPSLA_HH - customer.core_generic
HappyHour_OfferRequest003 - app.business_template
HappyHour_Simple5_Test11 - app.business_template
happyHourForExportImportTest - app.business_template
SegmentWindowsTestOffer1 - app.business_template
HappyHour_Simple1_Test11 - app.business_template
Scope: (undefined)
HappyHour.tgpa
composite.tgpa
*HappyHourSetup.tgpa
d
discount
edit documentation
ask for documentation
Problems
Builds
Progress
Soap Message Console
Call Hierarchy
Search
Hierarchy
ModelTalk Navigator
Description
Writable
Insert

```
namespace="customer.core_generic">








<A_BusinessTemplate xsi:type="app.business_template:HappyHour"
  ID="OOPSLA_HH" based-on="app.business_template#HappyHour_Base">
  <name>OOPSLA 20$ discount on selected tutorials !!!</name>
  <benefitDef xsi:type="app.business_template:HappyHourBenefitDefCP">
    <
  </b
</A_B
```

Model instance : “OOPSLA_HH”
Instance-of : “HappyHour”
Extends (i.e., prototyping) : “HappyHour_Base”

discount
The discounter that calculates the new price.

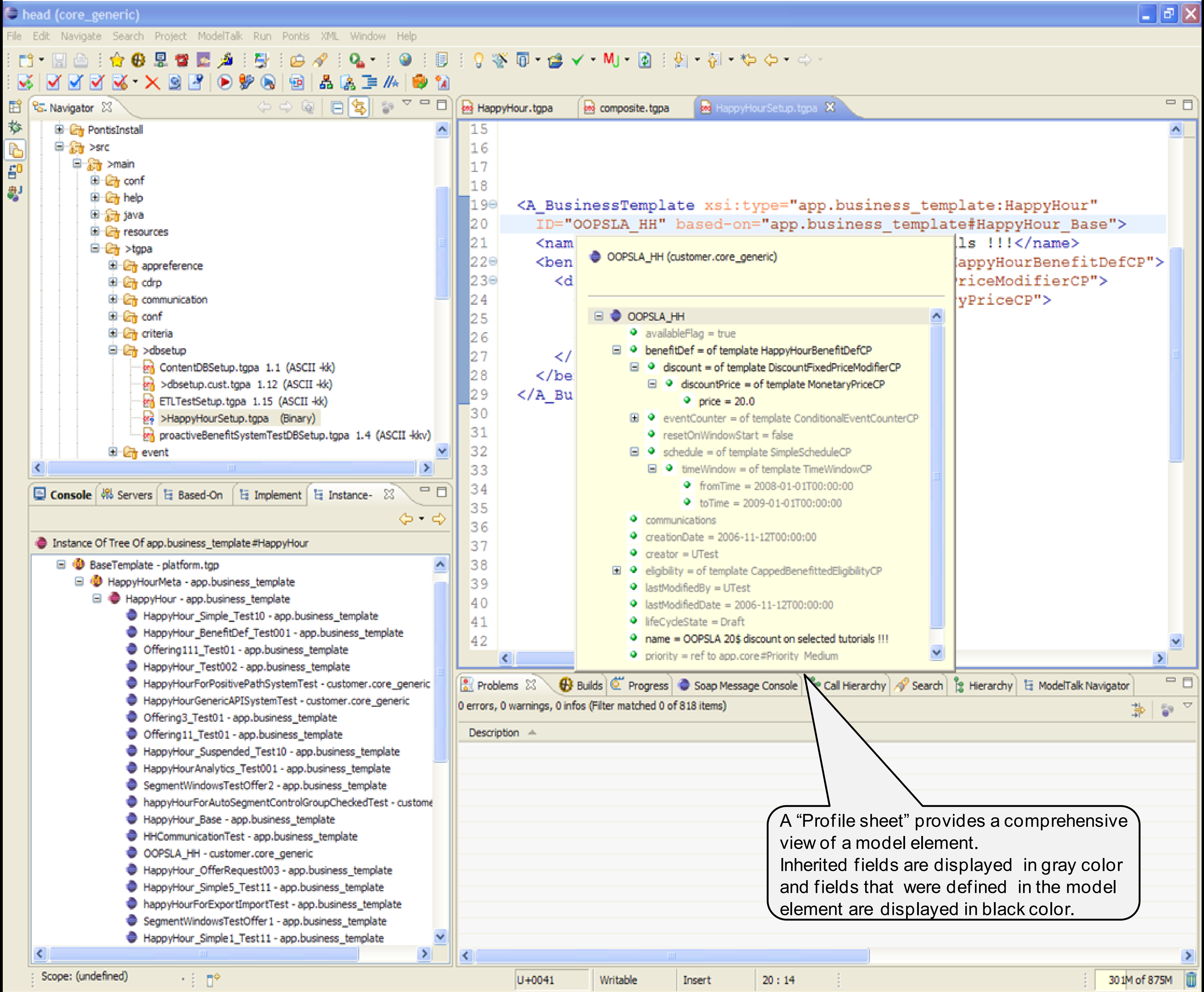
type: app.core#A_PriceModifierCP
Responsibility : calculation of the dismounted price.

Auto-completion for attributes values, tag names, etc.

1 error, 0 warnings, 0 infos (Filter matched 1 of 819 items)

Errors (1 of 1 items)
ModelTalk builder: element id=customer.core_generic#OOPSLA_HH.benefitDef. The field - discount is missing.

Upon a change to the model, the compiler is invoked to perform cross-model validation. An incremental model change takes no more than a few seconds. Errors are reported in the IDE standard problems view.



head (core_generic)

File Edit Navigate Search Project ModelTalk Run Pontis XML Window Help

Navigator

```
PontisInstall
  >src
    >main
      conf
      help
      java
      resources
      >tgpa
        appreference
        cdrp
        communication
        conf
        criteria
        >dbsetup
          ContentDBSetup.tgpa 1.1 (ASCII -kk)
          >dbsetup.cust.tgpa 1.12 (ASCII -kk)
          ETLTestSetup.tgpa 1.15 (ASCII -kk)
          >HappyHourSetup.tgpa (Binary)
          proactiveBenefitSystemTestDBSetup.tgpa 1.4 (ASCII -kkv)
        event
```

HappyHour.tgpa | composite.tgpa | HappyHourSetup.tgpa

```
<A_BusinessTemplate xsi:type="app.business_template:HappyHour"
  ID="OOPSLA_HH" based-on="app.business_template#HappyHour_Base">
  <nam                                          ls !!!</name>
  <ben                                          appyHourBenefitDefCP">
    <d                                          riceModifierCP">
                                                yPriceCP">


    </
  </be
</A_Bu
```

OOPSLA_HH (customer.core_generic)

```
OOPSLA_HH
  availableFlag = true
  benefitDef = of template HappyHourBenefitDefCP
    discount = of template DiscountFixedPriceModifierCP
      discountPrice = of template MonetaryPriceCP
        price = 20.0
    eventCounter = of template ConditionalEventCounterCP
    resetOnWindowStart = false
    schedule = of template SimpleScheduleCP
      timeWindow = of template TimeWindowCP
        fromTime = 2008-01-01T00:00:00
        toTime = 2009-01-01T00:00:00
  communications
  creationDate = 2006-11-12T00:00:00
  creator = UTest
  eligibility = of template CappedBenefittedEligibilityCP
  lastModifiedBy = UTest
  lastModifiedDate = 2006-11-12T00:00:00
  lifeCycleState = Draft
  name = OOPSLA 20$ discount on selected tutorials !!!
  priority = ref to app.core#Priority_Medium
```

Console | Servers | Based-On | Implement | Instance-

Instance Of Tree Of app.business_template#HappyHour

```
BaseTemplate - platform.tgp
  HappyHourMeta - app.business_template
    HappyHour - app.business_template
      HappyHour_Simple_Test10 - app.business_template
      HappyHour_BenefitDef_Test001 - app.business_template
      Offering111_Test01 - app.business_template
      HappyHour_Test002 - app.business_template
      HappyHourForPositivePathSystemTest - customer.core_generic
      HappyHourGenericAPISystemTest - customer.core_generic
      Offering3_Test01 - app.business_template
      Offering11_Test01 - app.business_template
      HappyHour_Suspended_Test10 - app.business_template
      HappyHourAnalytics_Test001 - app.business_template
      SegmentWindowsTestOffer2 - app.business_template
      happyHourForAutoSegmentControlGroupCheckedTest - custome
      HappyHour_Base - app.business_template
      HHCommunicationTest - app.business_template
      OOPSLA_HH - customer.core_generic
      HappyHour_OfferRequest003 - app.business_template
      HappyHour_Simple5_Test11 - app.business_template
      happyHourForExportImportTest - app.business_template
      SegmentWindowsTestOffer1 - app.business_template
      HappyHour_Simple1_Test11 - app.business_template
```

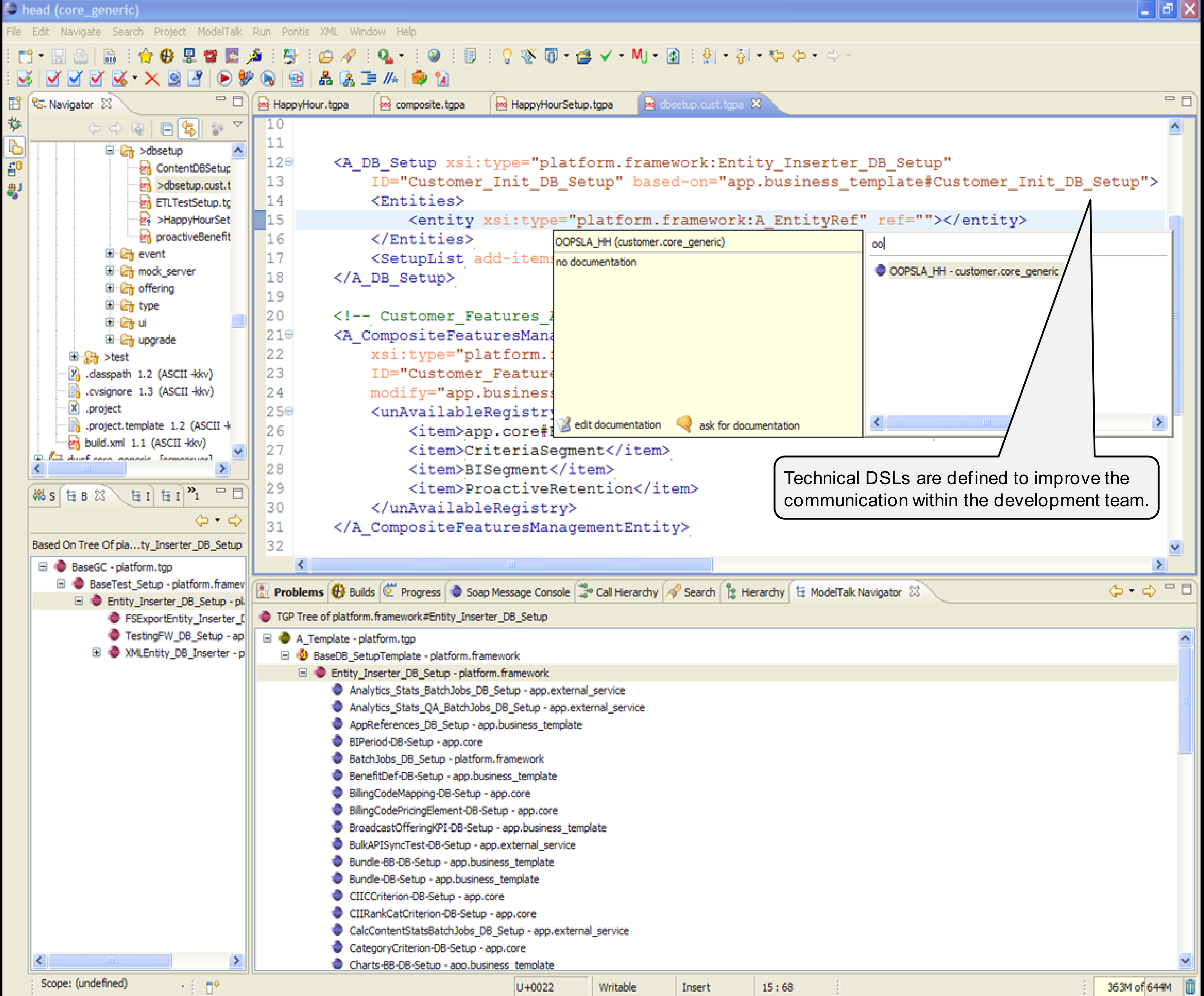
Problems | Builds | Progress | Soap Message Console | Call Hierarchy | Search | Hierarchy | ModelTalk Navigator

0 errors, 0 warnings, 0 infos (Filter matched 0 of 818 items)

Description

Scope: (undefined) | U+0041 | Writable | Insert | 20 : 14 | 301M of 875M

A “Profile sheet” provides a comprehensive view of a model element.
Inherited fields are displayed in gray color and fields that were defined in the model element are displayed in black color.



```
  <A_DB_Setup xsi:type="platform.framework:Entity_Inserter_DB_Setup"
      ID="Customer_Init_DB_Setup" based-on="app.business_template#Customer_Init_DB_Setup">
      <Entities>
          <entity xsi:type="platform.framework:A_EntityRef" ref=""></entity>
      </Entities>
      <SetupList add-items
  </A_DB_Setup>

  <!-- Customer_Features_
  <A_CompositeFeaturesMana
      xsi:type="platform.
      ID="Customer_Feature
      modify="app.busines
      <unAvailableRegistry
          <item>app.core#
          <item>CriteriaSegment</item>
          <item>BISegment</item>
          <item>ProactiveRetention</item>
      </unAvailableRegistry>
  </A_CompositeFeaturesManagementEntity>
```

```
>dbsetup
  ContentDBSetup
  >dbsetup.cust.t
  ETLTestSetup.tg
  >HappyHourSet
  proactiveBenefit
event
mock_server
offering
type
ui
upgrade
>test
.classpath 1.2 (ASCII -kkv)
.cvsignore 1.3 (ASCII -kkv)
.project
.project.template 1.2 (ASCII -
build.xml 1.1 (ASCII -kkv)
```

```
Based On Tree Of pla...ty_Inserter_DB_Setup
BaseGC - platform.tgp
  BaseTest_Setup - platform.framew
    Entity_Inserter_DB_Setup - pl
      FSExportEntity_Inserter_[
      TestingFW_DB_Setup - ap
      XMLEntity_DB_Inserter - p
```

```
TGP Tree of platform.framework#Entity_Inserter_DB_Setup
A_Template - platform.tgp
  BaseDB_SetupTemplate - platform.framework
    Entity_Inserter_DB_Setup - platform.framework
      Analytics_Stats_BatchJobs_DB_Setup - app.external_service
      Analytics_Stats_QA_BatchJobs_DB_Setup - app.external_service
      AppReferences_DB_Setup - app.business_template
      BIPeriod-DB-Setup - app.core
      BatchJobs_DB_Setup - platform.framework
      BenefitDef-DB-Setup - app.business_template
      BillingCodeMapping-DB-Setup - app.core
      BillingCodePricingElement-DB-Setup - app.core
      BroadcastOfferingKPI-DB-Setup - app.business_template
      BulkAPISyncTest-DB-Setup - app.external_service
      Bundle-BB-DB-Setup - app.business_template
      Bundle-DB-Setup - app.business_template
      CIICCriterion-DB-Setup - app.core
      CIIRankCatCriterion-DB-Setup - app.core
      CalcContentStatsBatchJobs_DB_Setup - app.external_service
      CategoryCriterion-DB-Setup - app.core
      Charts-BB-DB-Setup - app.business_template
```

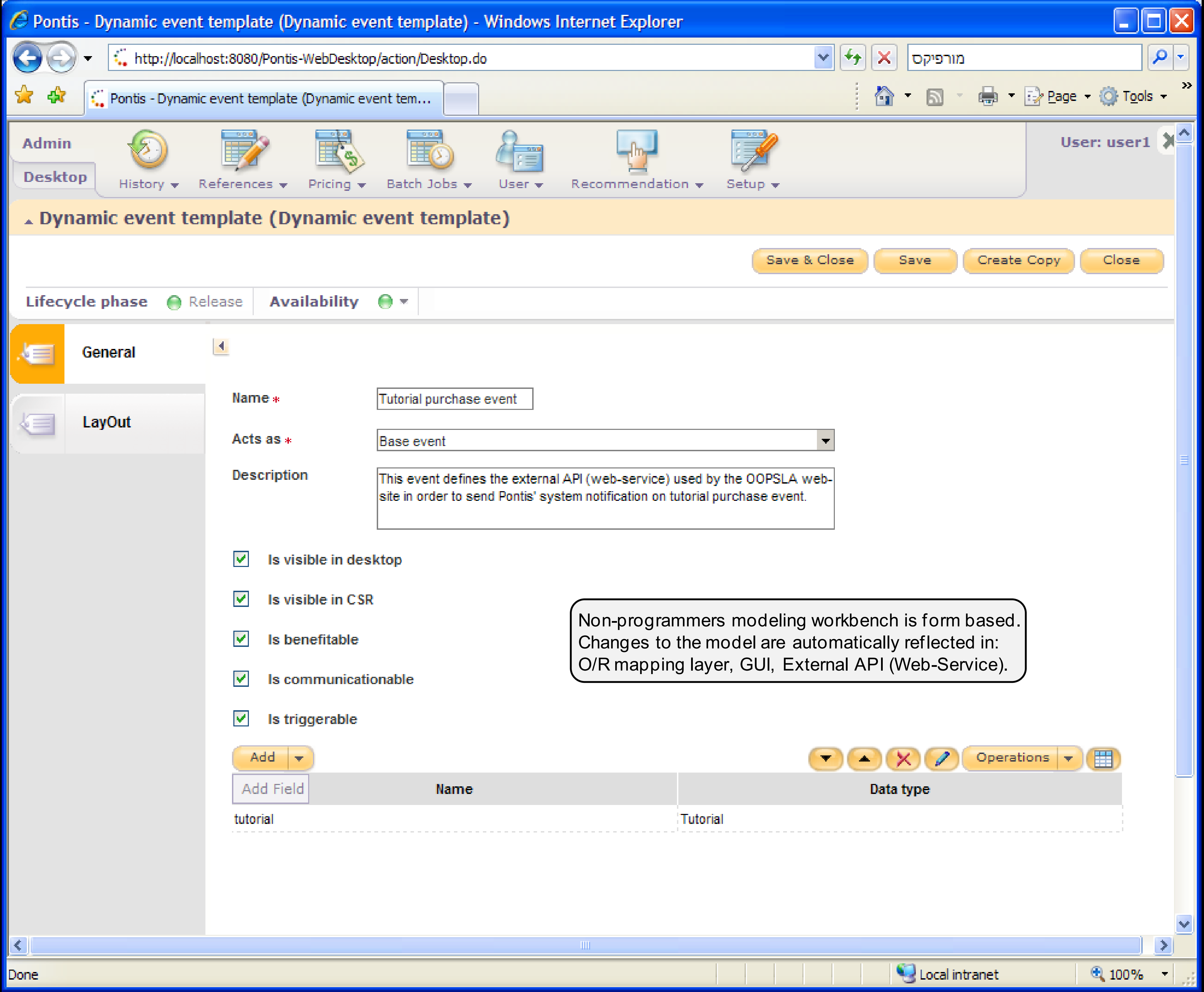
Technical DSLs are defined to improve the communication within the development team.

Demo: Edit-Execute Cycle (2/2)

Part II: By a Non-programmer

- Create new reference code Tutorial in the GUI
- Create new OOPSLA event Tutorial purchase Event in the GUI
- Send an event to the Pontis system and receive a discount

Model VM → Runtime modeling capabilities
Interpretive → Short cycle



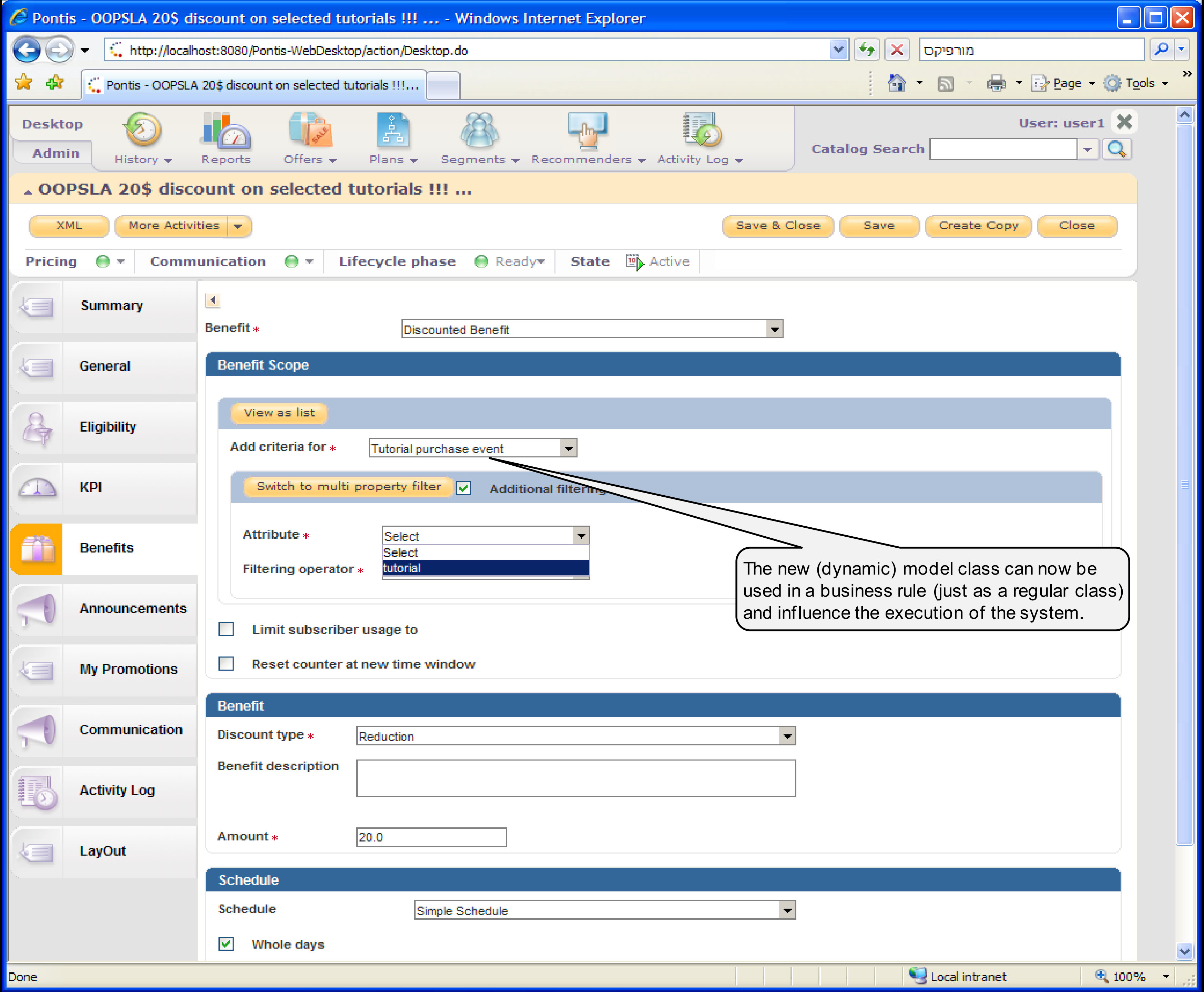
Dynamic event template (Dynamic event template)

Name *	Tutorial purchase event
Acts as *	Base event
Description	This event defines the external API (web-service) used by the OOPSLA web-site in order to send Pontis' system notification on tutorial purchase event.

- ✓ Is visible in desktop
- ✓ Is visible in CSR
- ✓ Is benefitable
- ✓ Is communicationable
- ✓ Is triggerable

Name	Data type
tutorial	Tutorial

Non-programmers modeling workbench is form based.
Changes to the model are automatically reflected in:
O/R mapping layer, GUI, External API (Web-Service).


Pontis - OOPSLA 20$ discount on selected tutorials !!! ... - Windows Internet Explorer

http://localhost:8080/Pontis-WebDesktop/action/Desktop.do

User: user1

Catalog Search

OOPSLA 20$ discount on selected tutorials !!! ...

Pricing | Communication | Lifecycle phase: Ready | State: Active

Benefit: Discounted Benefit

Benefit Scope

Add criteria for: Tutorial purchase event

Additional filtering ✓

Attribute: Select (Select / tutorial)

Filtering operator

☐ Limit subscriber usage to

☐ Reset counter at new time window

Benefit

Discount type: Reduction

Benefit description

Amount: 20.0

Schedule

Schedule: Simple Schedule

✓ Whole days

The new (dynamic) model class can now be used in a business rule (just as a regular class) and influence the execution of the system.

Conclusion

ModelTalk = MDD + Dependency Injection + Meta-modeling

- ModelTalk integrates MDD, Dependency Injection and Meta-Modeling to form an interpretive, Domain Specific Modeling framework.

Thank You

ModelTalk: A Framework for Developing Domain Specific Executable Models

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