Tutorial

Complex Service

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Tutorial	Actifsource Tutorial – Complex Service
Required Time	• 60 Minutes
Prerequisites	• Actifsource Tutorial – Installing Actifsource • Actifsource Tutorial – Simple Service
Goal	• Use Java Functions to reuse text fragments in your templates and capture complex expressions to keep your templates clean and easy to read • Use Function Spaces to keep Java Functions organized
Topics covered	• Extracting Java Functions from template code • Editing Java Functions • Advanced Template Editor Context Operations • Functions Spaces • Built-in Java Functions • Place generated code in specific folders • Copy with Context
Notation	↳ To do ⓘ Information • **Bold**: Terms from actifsource or other technologies and tools • <u>**Bold underlined**</u>: actifsource Resources • <u>Underlined</u>: User Resources • <u>*UnderlinedItalics*</u>: Resource Functions • `Monospaced`: User input • *Italics*: Important terms in current situation
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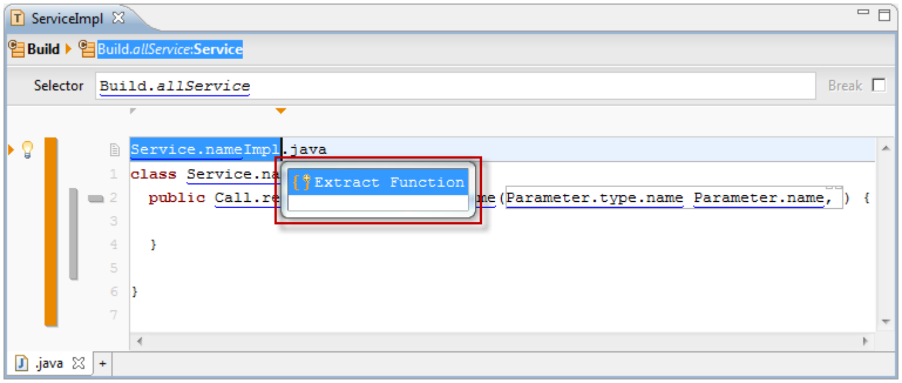
Overview

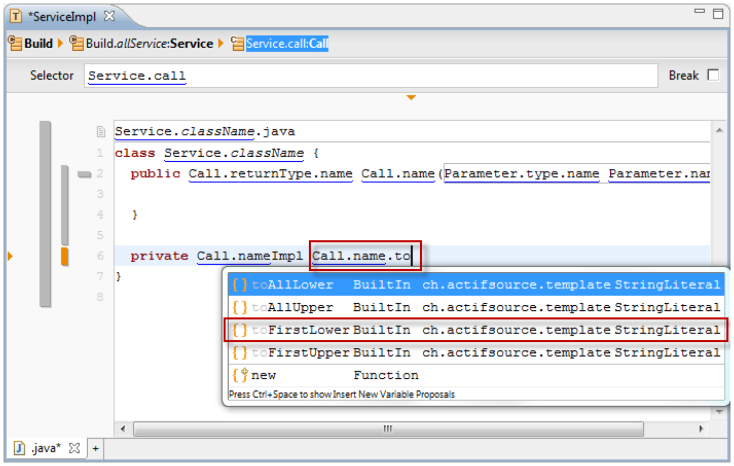
- Prepare a new actifsource Project as seen in the Actifsource Tutorial – Simple Service
- Learn how to extract Java Functions from template code to cope with complex situations



```
Service.nameImpl.java
class Service.na
  public Call.re                      me(Parameter.type.name Parameter.name, ) {

  }

}
```

Selector: `Build.allService`

- Edit Java Functions
- Learn about advanced Context Operations in the Template Editor
- Learn about Function Spaces and how to place functions
- Use built-in functions



Selector: `Service.call`

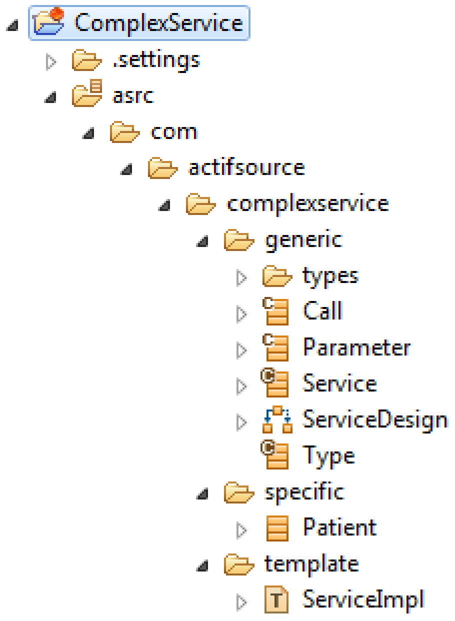
```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.nar

  }

  private Call.nameImpl Call.name.to
}
```

```
toAllLower   BuiltIn  ch.actifsource.template StringLiteral
toAllUpper   BuiltIn  ch.actifsource.template StringLiteral
toFirstLower BuiltIn  ch.actifsource.template StringLiteral
toFirstUpper BuiltIn  ch.actifsource.template StringLiteral
new          Function
Press Ctrl+Space to show Insert New Variable Proposals
```

- Generate code for specific folders
- Copy template code with its Context

Part I: Preparation

- Prepare a new **actifsource Project** as seen in the *Actifsource Tutorial – Simple Service*
  - Setup the Target Folder *src*
  - Create a **Generic Domain Model**
  - Create a **Specific Domain Model**
  - Create a **Code Template**
- Use the following package structure



```
ComplexService
  .settings
  asrc
    com
      actifsource
        complexservice
          generic
            types
            Call
            Parameter
            Service
            ServiceDesign
            Type
          specific
            Patient
          template
            ServiceImpl
```

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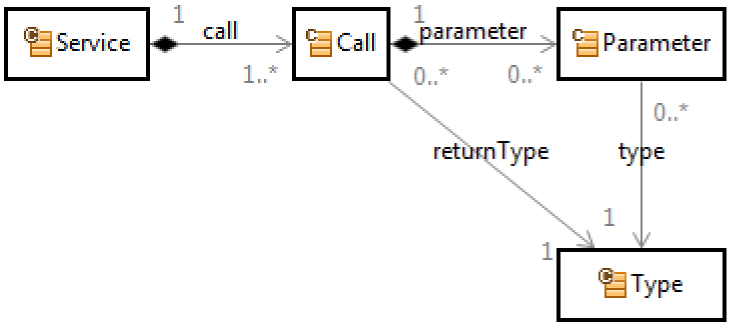

- Create a **Generic Domain Model** in the **DiagramEditor** named *ServiceDesign* in the **Package** *generic*
- The Design shall contain the following **Domain Classes**
  - Service, Call, Parameter, Type
- Insert a **OwnRelations** between
  - Service and Call
  - Call and Parameter
- Insert a **UseRelations** between
  - Call and Type
  - Parameter and Type
- Adjust the **Cardinalities** as shown above

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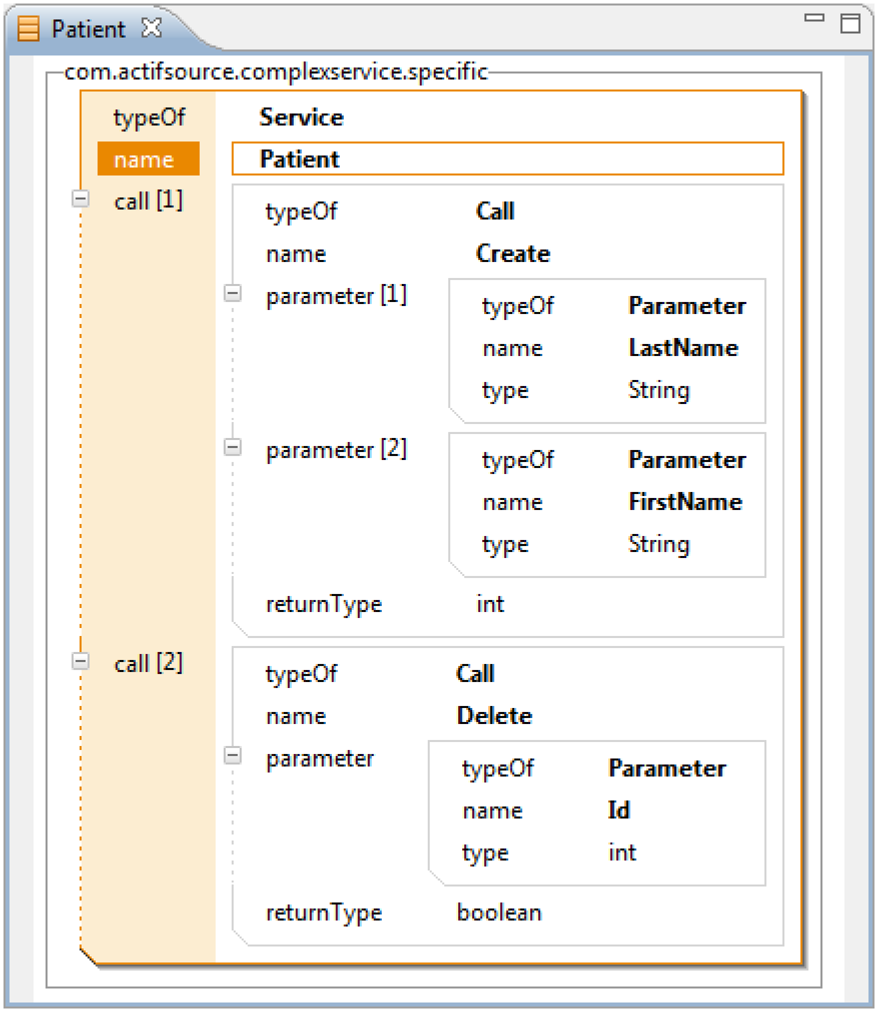
Create a Specific Domain Model



Patient

com.actifsource.complexservice.specific

typeOf	Service			
name	Patient			
call [1]	typeOf	Call		
	name	Create		
	parameter [1]		typeOf	Parameter
			name	LastName
			type	String
	parameter [2]		typeOf	Parameter
			name	FirstName
			type	String
	returnType	int		
call [2]	typeOf	Call		
	name	Delete		
	parameter		typeOf	Parameter
			name	Id
			type	int
	returnType	boolean		

- Create a Service named Patient in the **Package** *specific*
- Add the Calls Create and Delete
- Add the Parameter LastName, FirstName and Id as shown above
- Add the returnTypes as shown above

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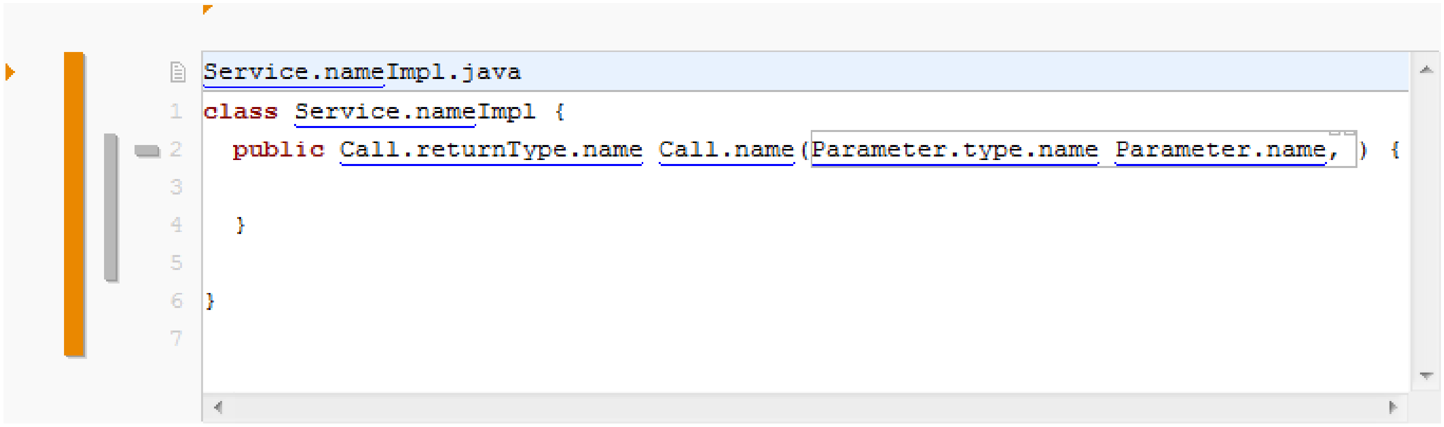
Create a Code Template



```
Service.nameImpl.java
class Service.nameImpl {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

}
```

- Create a **Code Template** named *ServiceImpl* in the **Package** *template*
- Write code as shown above
- ⓘ The function shall be placed in the **Context** Call; **Selector** is Service.call
- ⓘ The function parameters shall be placed in the **Context** Parameter; **Selector** is Call.parameter
- Save the **Code Template**

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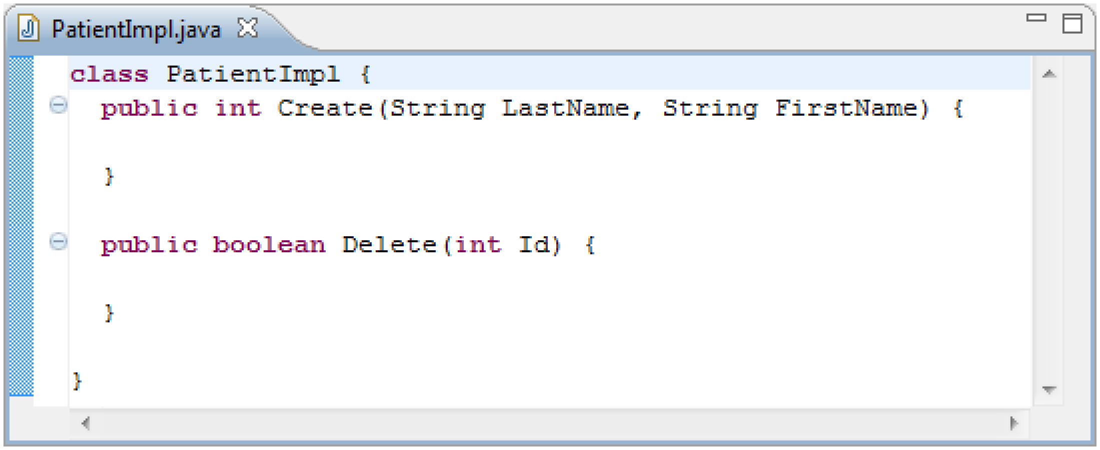
Generate Code



```
class PatientImpl {
  public int Create(String LastName, String FirstName) {

  }

  public boolean Delete(int Id) {

  }

}
```

ⓘ You’ll find the generated code *PatientImpl.java* in the **Target Folder** *src*

Part II: Java Functions

- Use **Java Functions** to
    - extract recurring text fragments from your templates
    - capture complex expressions to keep your templates clean and easy to read
- Use **Java Classes** generated from your **Generic Domain Model** to write and maintain complex **Java Functions**

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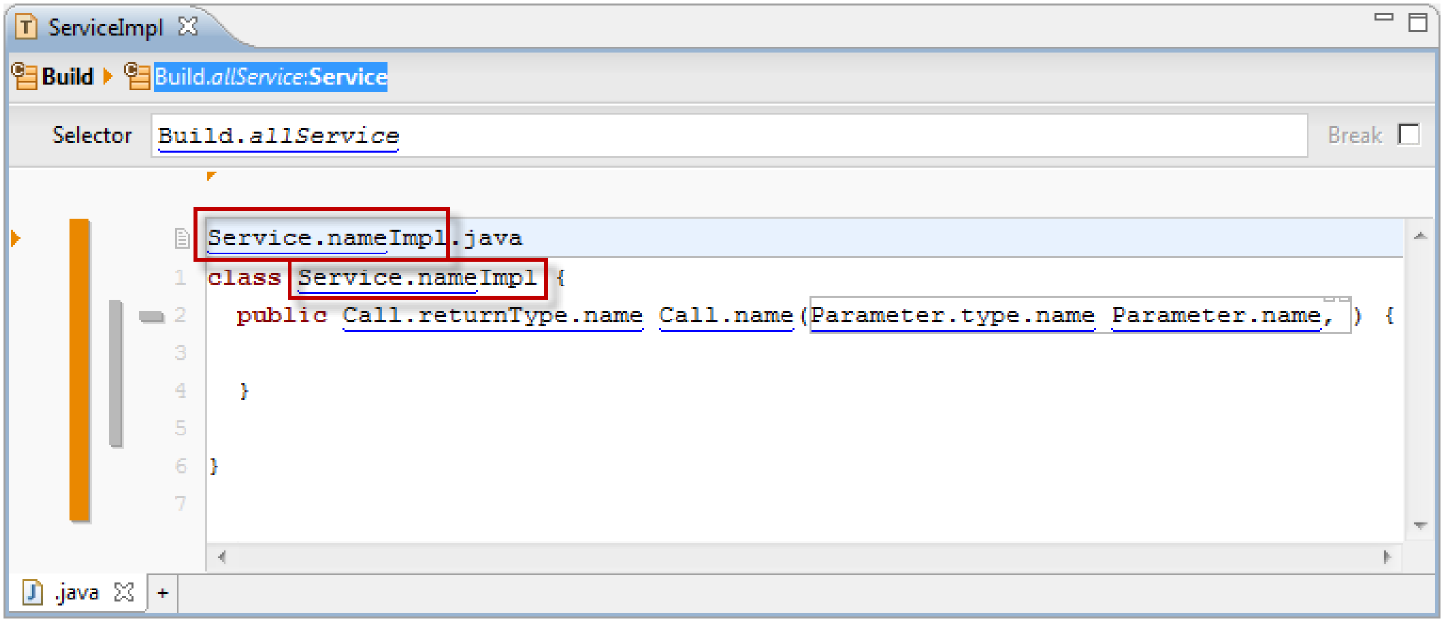
Extract Function



```
Build.allService
```

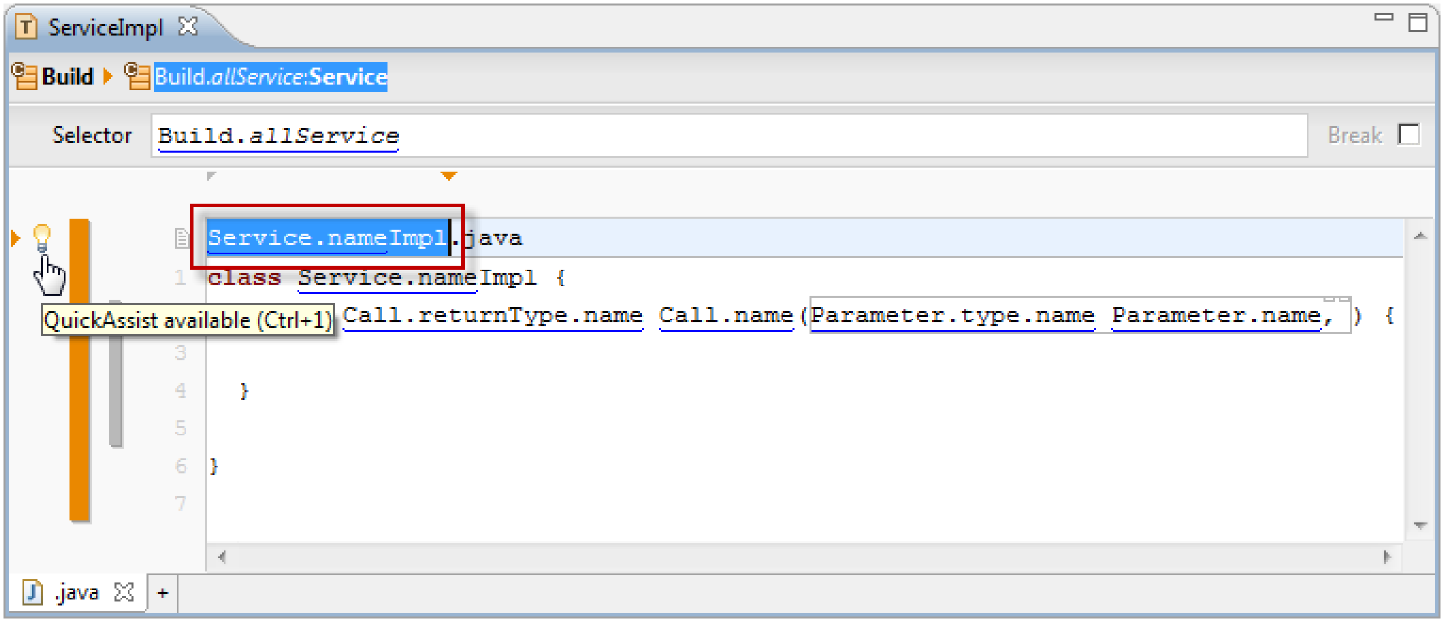
```
Service.nameImpl.java
class Service.nameImpl {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

}
```

- ⓘ Note that the term *Service.nameImpl* is used twice
- ⓘ We should extract identical terms to honor the DRY principle (Don’t Repeat Yourself)

Extract Function



```
Build.allService
```

```
Service.nameImpl.java
class Service.nameImpl {
  Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

}
```

- In your template select the text you want to extract into a function
- The light bulb at the left hand indicates **Quick Assist** is available

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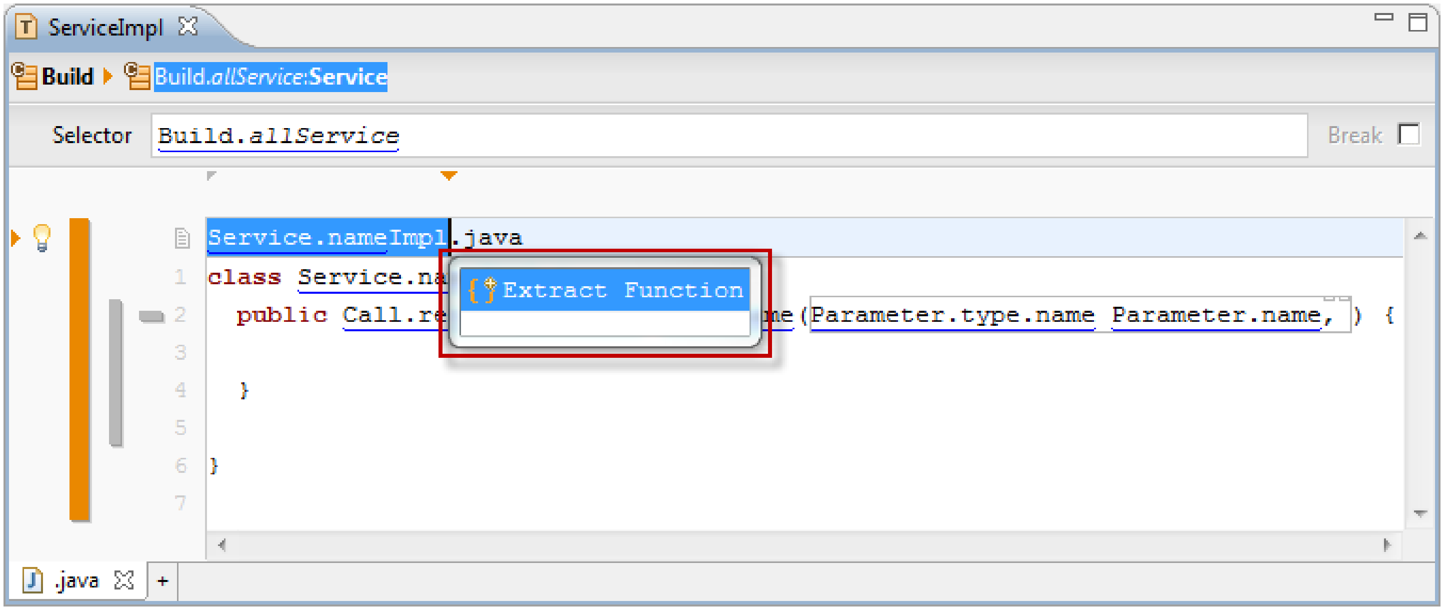

```
Build.allService
```

```
Service.nameImpl.java
class Service.na
  public Call.re                           me(Parameter.type.name Parameter.name, ) {

  }

}
```

- Activate **QuickAssist** by clicking the light bulb or by pressing Ctrl+1
- Click *Extract Function*

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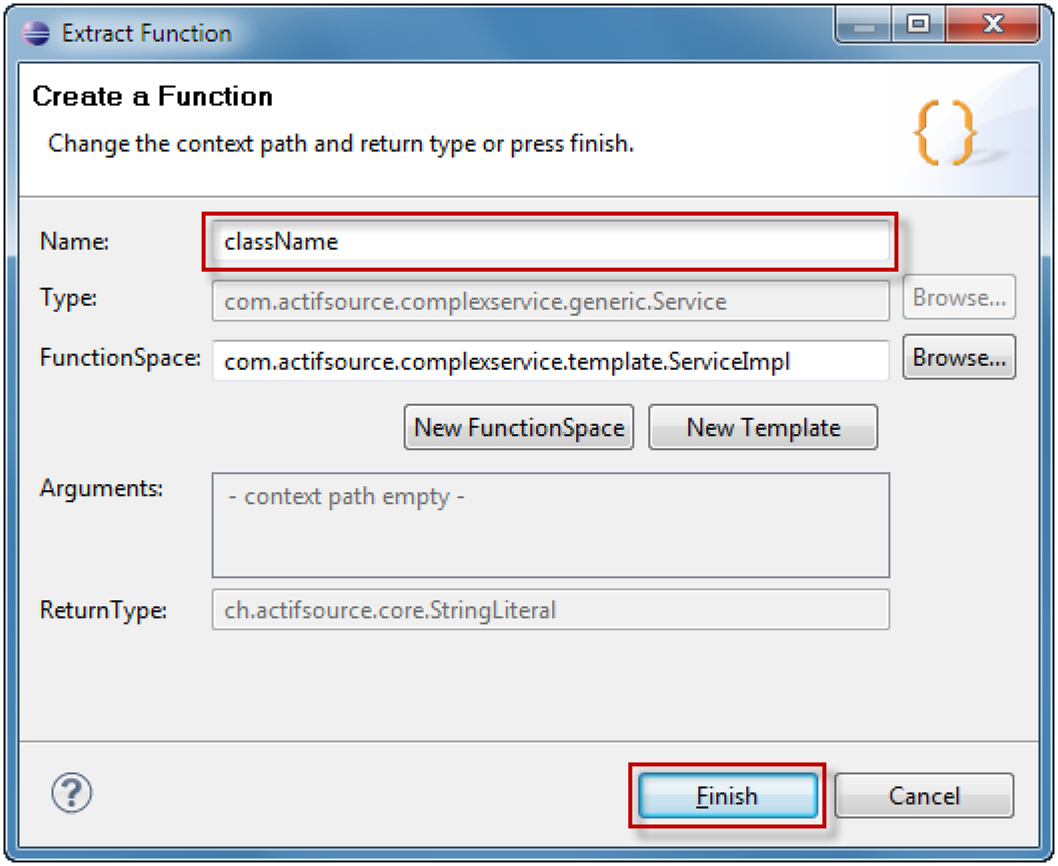

Change the context path and return type or press finish.

Name: className

Type: com.actifsource.complexservice.generic.Service

FunctionSpace: com.actifsource.complexservice.template.ServiceImpl

Arguments: - context path empty -

ReturnType: ch.actifsource.core.StringLiteral

- Name the function `className`
- Click *Finish*

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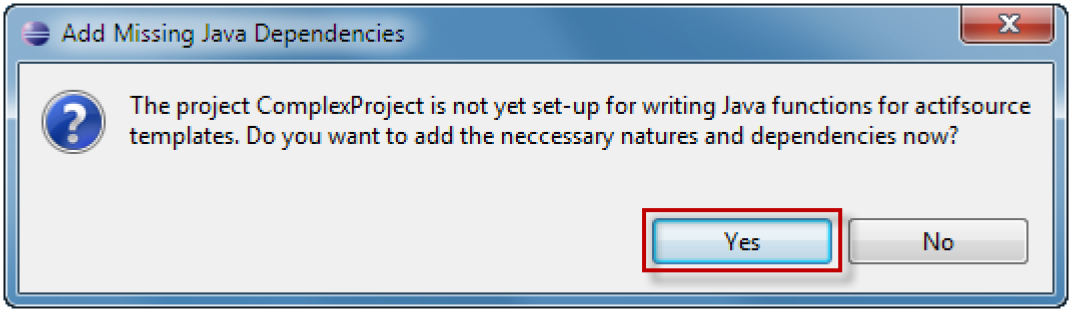
Enable Java Functions for Templates


Add Missing Java Dependencies

The project ComplexProject is not yet set-up for writing Java functions for actifsource templates. Do you want to add the neccessary natures and dependencies now?

- ⓘ **Java Functions** are evaluated during code generation
- ⓘ Therefore, your Project has to be a **Java Project**
- ↳ Click *Yes* to add the necessary settings to your Project

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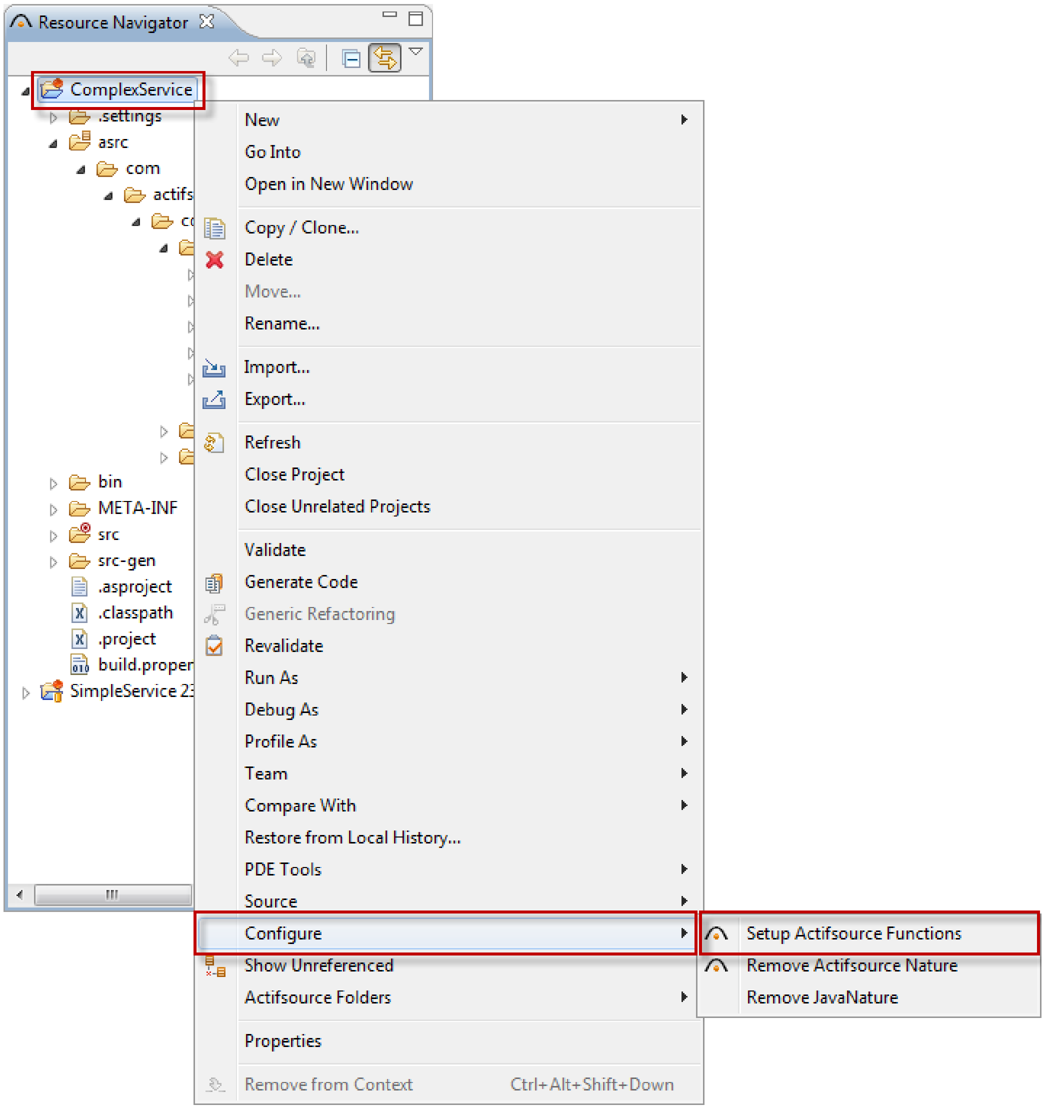
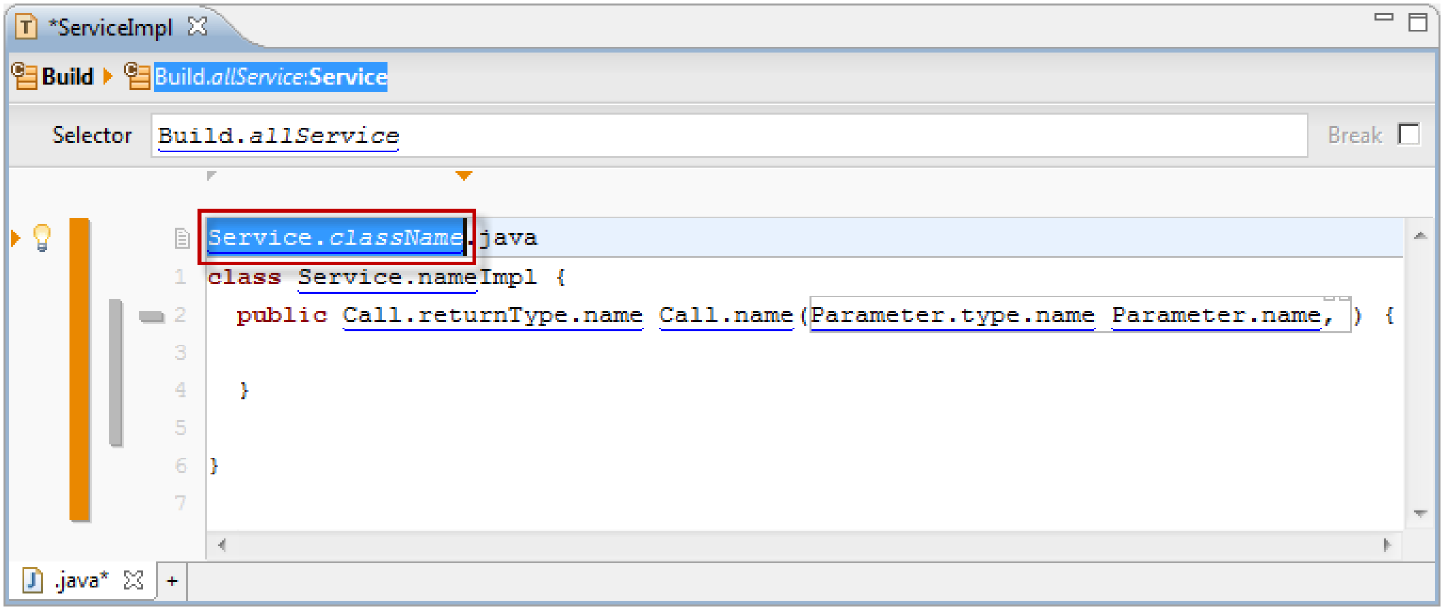
Enable Java Functions for Templates



ⓘ You can enable **Java Functions** anytime as shown above

Using Functions



Selector: `Build.allService`

```
Service.className.java
class Service.nameImpl {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

}
```

ⓘ The new function className returns the extracted fragment from your template

ⓘ The static function className is added to the static Java class ServiceImpl.ServiceFunctions in class ServiceImpl; this class is automatically generated by actifsource

ⓘ The term Service.nameImpl has been replaced by the function Service.*className*

ⓘ **Java Functions** are shown in *italics* in the **actifsource Template Editor**

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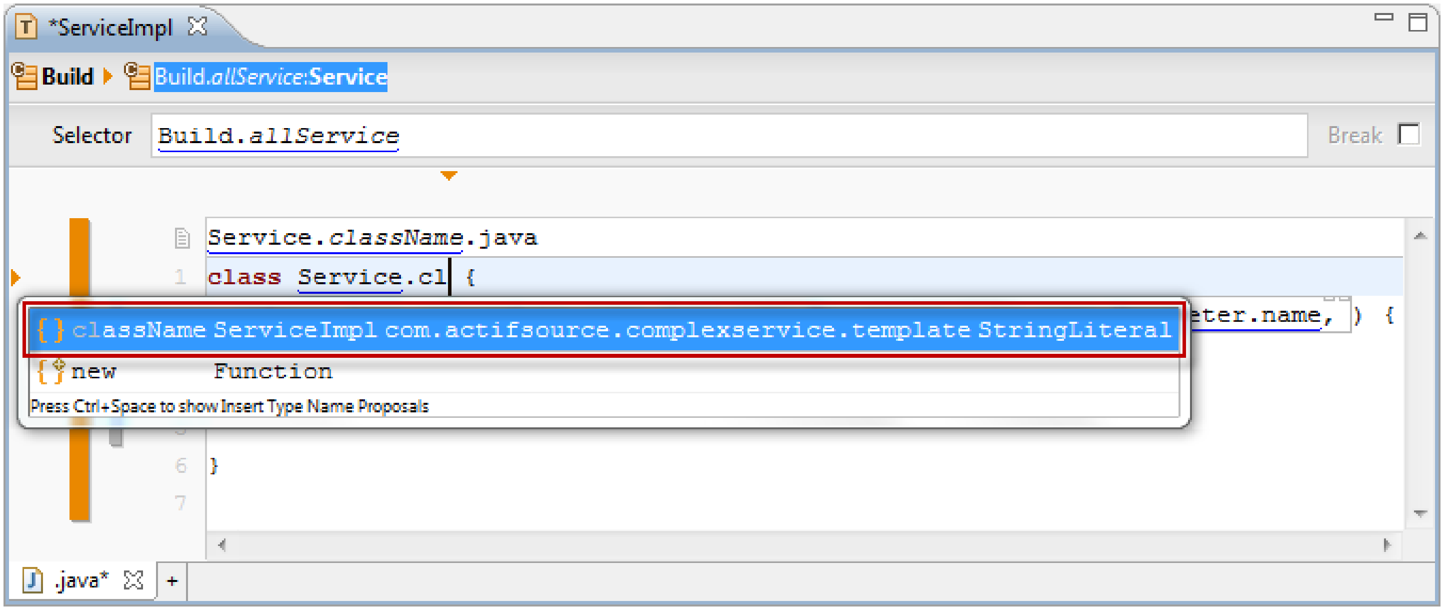


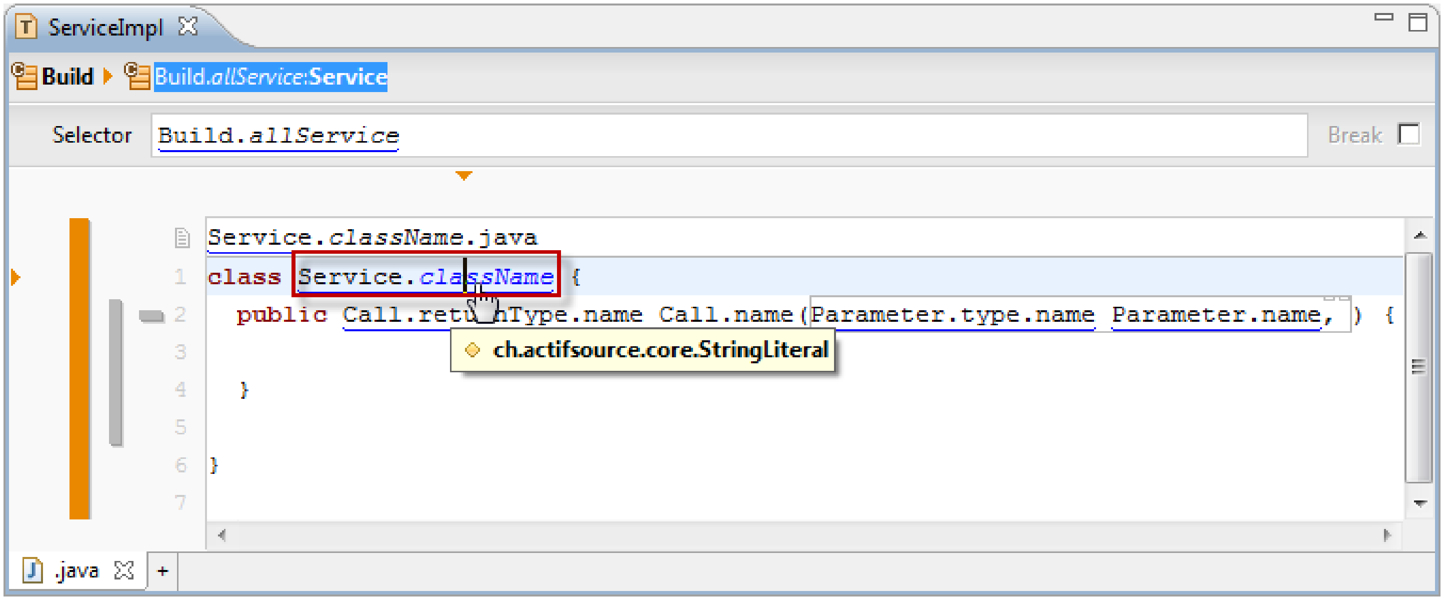
```
Build.allService
```

```
Service.className.java
class Service.cl {
eter.name, ) {
}
```

```
{} className ServiceImpl com.actifsource.complexservice.template StringLiteral
{} new        Function
Press Ctrl+Space to show Insert Type Name Proposals
```

ⓘ Let’s replace the second occurrence of the term Service.nameImpl

↳ Use **Content Assist** (Ctrl+Space) on Service to insert the function *className* for your class name

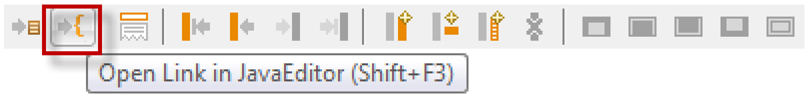


```
Build.allService
```

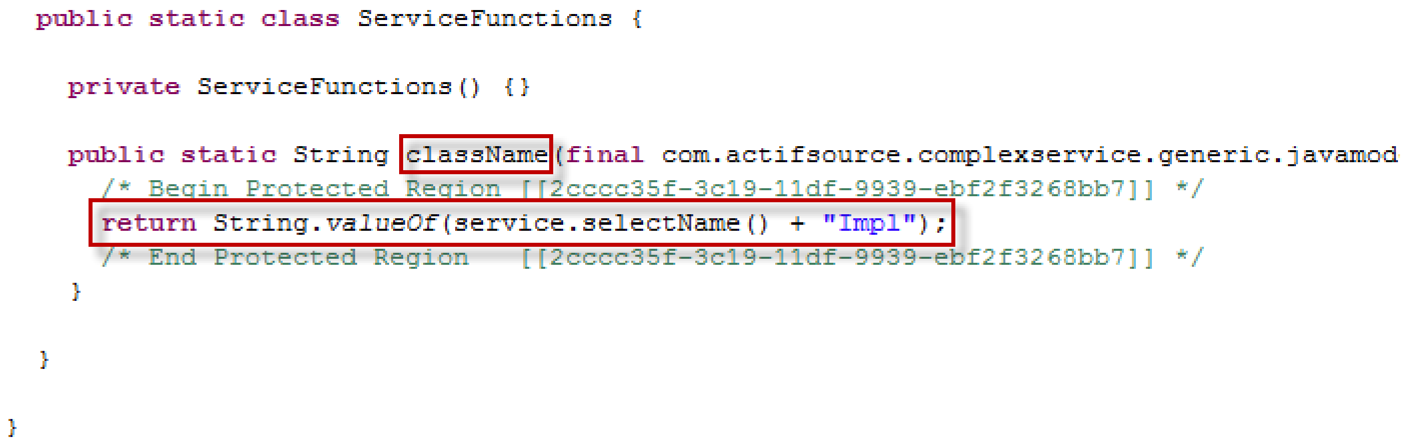
```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

}
```

Open the underlying **Java Function** (Ctrl+Shift+Left-Click)

ⓘ Alternatively, you can use the **Tool** *Open Link in JavaEditor* from the **actifsource Template Editor** toolbar

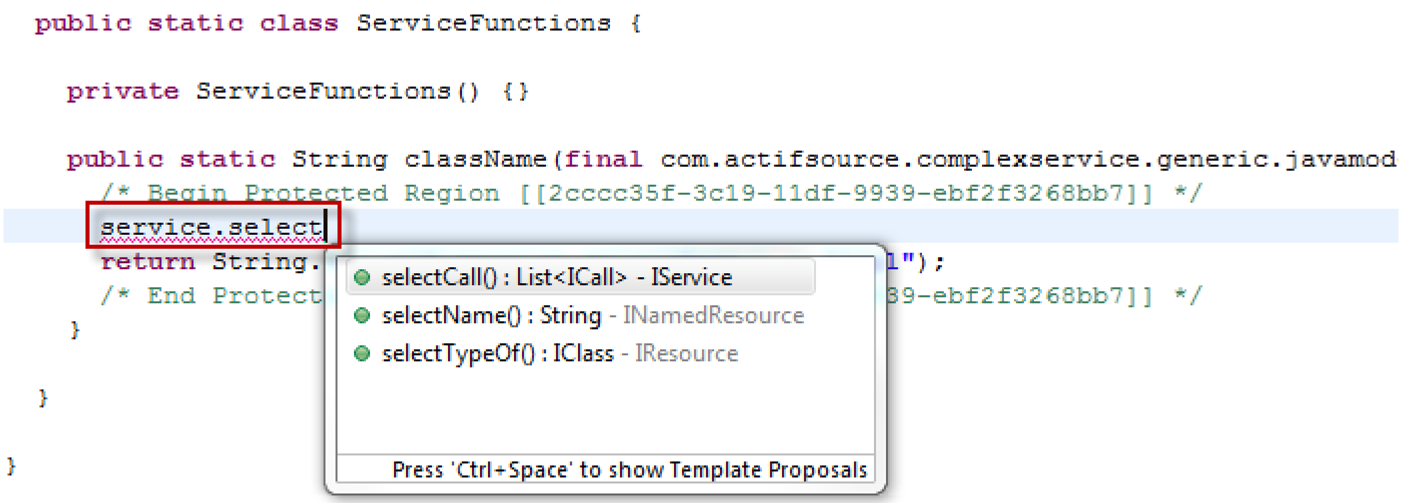


Editing Functions



```
  public static class ServiceFunctions {

    private ServiceFunctions() {}

    public static String className(final com.actifsource.complexservice.generic.javamod
      /* Begin Protected Region [[2cccc35f-3c19-11df-9939-ebf2f3268bb7]] */
      return String.valueOf(service.selectName() + "Impl");
      /* End Protected Region   [[2cccc35f-3c19-11df-9939-ebf2f3268bb7]] */
    }

  }

}
```

ⓘ The class ServiceImpl is opened in the **Java Editor** showing your function className



```
  public static class ServiceFunctions {

    private ServiceFunctions() {}

    public static String className(final com.actifsource.complexservice.generic.javamod
      /* Begin Protected Region [[2cccc35f-3c19-11df-9939-ebf2f3268bb7]] */
      service.select
      return String.                                                   1");
      /* End Protect                                                   39-ebf2f3268bb7]] */
    }

  }

}
```

```
selectCall() : List<ICall> - IService
selectName() : String - INamedResource
selectTypeOf() : IClass - IResource
```

ⓘ Note that actifsource generates a *select* method for each property of the corresponding class in the **Generic Domain Model.** You may use these methods to traverse your **Generic Domain Model** using the respective *selectPROPERTY()* methods in your **Java Functions**

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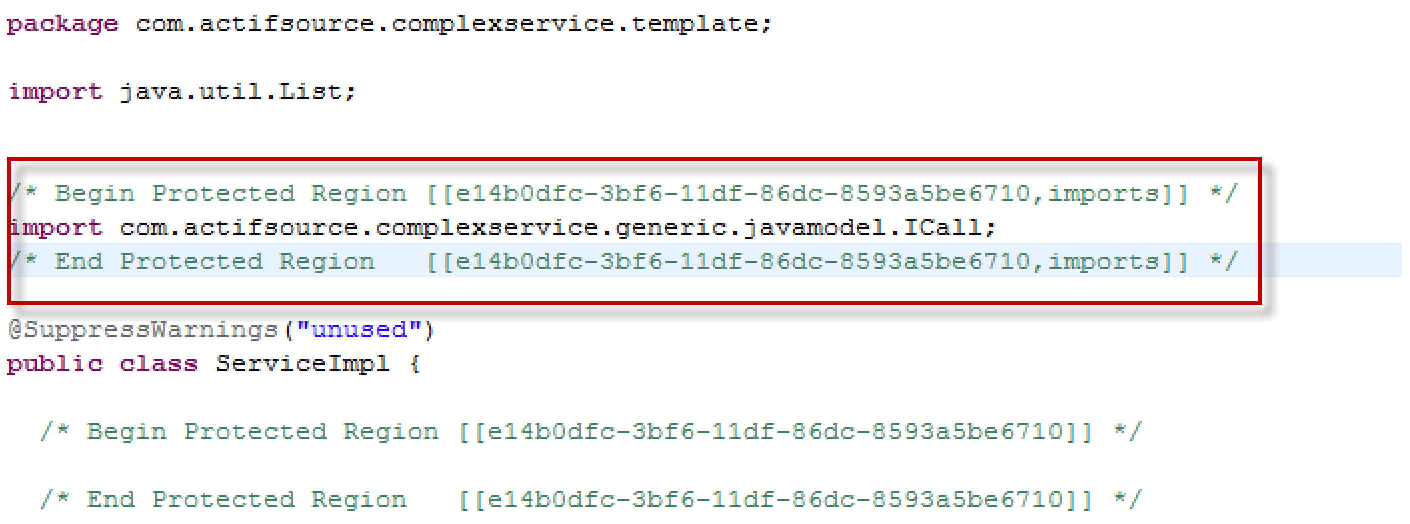

```
package com.actifsource.complexservice.template;

import java.util.List;

/* Begin Protected Region [[e14b0dfc-3bf6-11df-86dc-8593a5be6710,imports]] */
import com.actifsource.complexservice.generic.javamodel.ICall;
/* End Protected Region   [[e14b0dfc-3bf6-11df-86dc-8593a5be6710,imports]] */

@SuppressWarnings("unused")
public class ServiceImpl {

  /* Begin Protected Region [[e14b0dfc-3bf6-11df-86dc-8593a5be6710]] */

  /* End Protected Region   [[e14b0dfc-3bf6-11df-86dc-8593a5be6710]] */
```

- ⓘ Make sure to place additional imports within the corresponding **Protected Regions**
- ⓘ Please note that all code outside **Protected Regions** will be overwritten if the respective source file is re-generated.

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Part III:

Function Spaces

- **Function Declarations** are managed as **actifsource Resources**
- All **Function Declarations** are placed in **Functions Spaces**
- **Templates** are **Functions Spaces** by default
- **Functions Spaces** can exist without **Templates**
- **Function Spaces** are **Resources** and can therefore be placed in **Packages**

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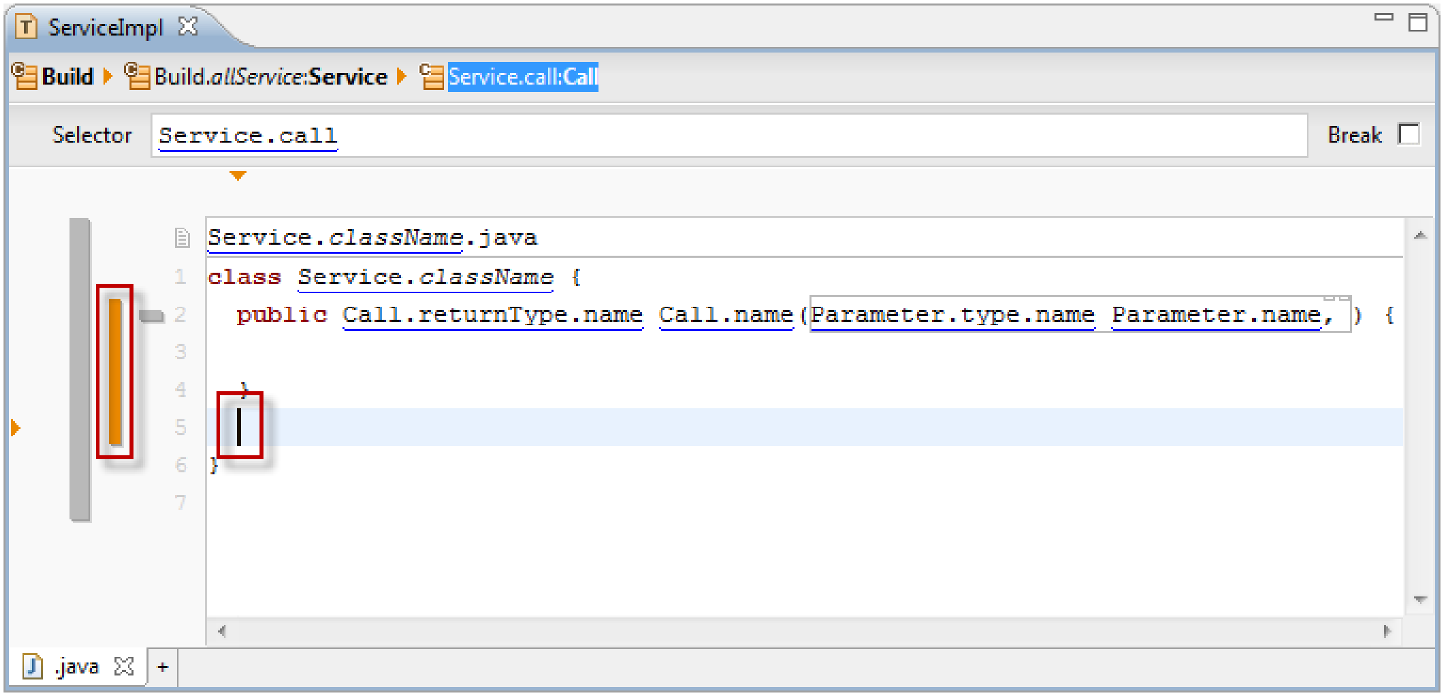

Selector: `Service.call`

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

}
```

ⓘ Let's add a new line after the Call **Context** in the Service **Context**

↳ Place cursor on the last position of the Call **Context**

ⓘ Note that the corresponding **Context Bar** is highlighted

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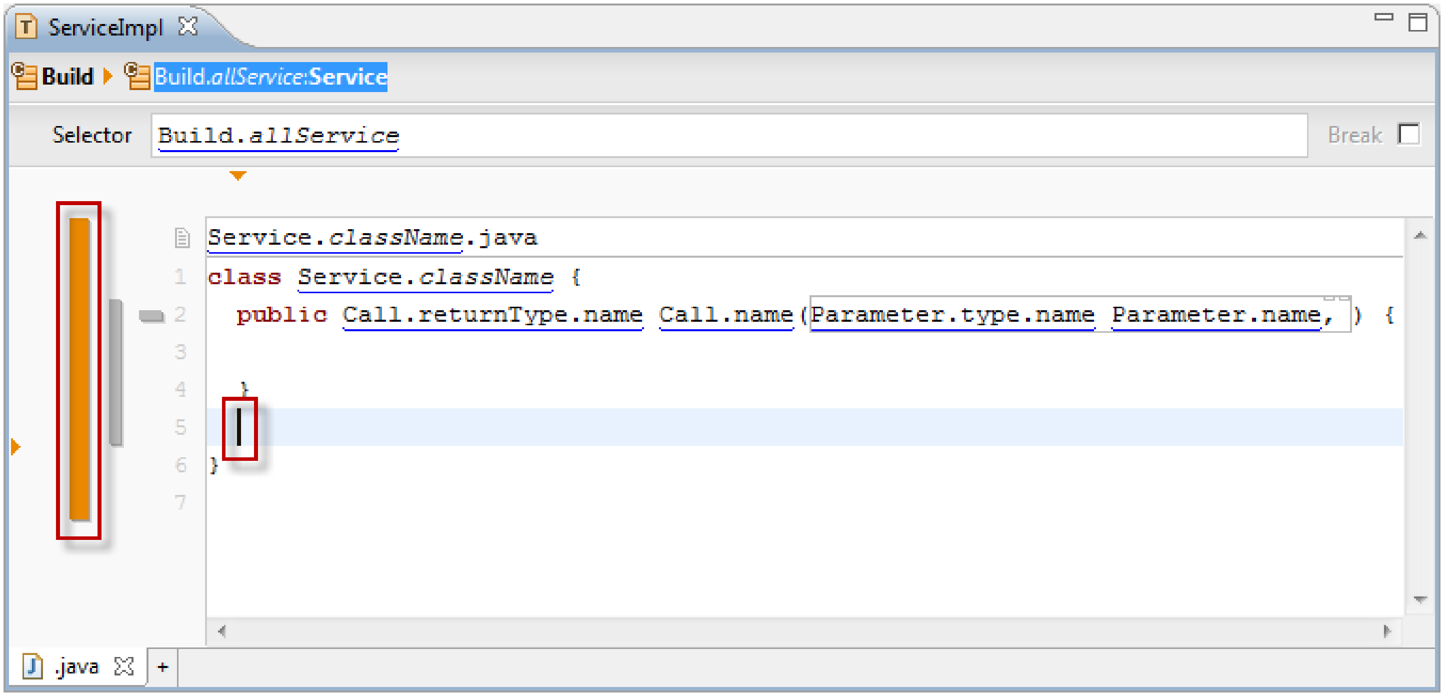
Advanced Context Operations



```
Build.allService
```

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

}
```

Press Cursor-Right

ⓘ While the cursor stays at its position, the Service **Context** is now highlighted

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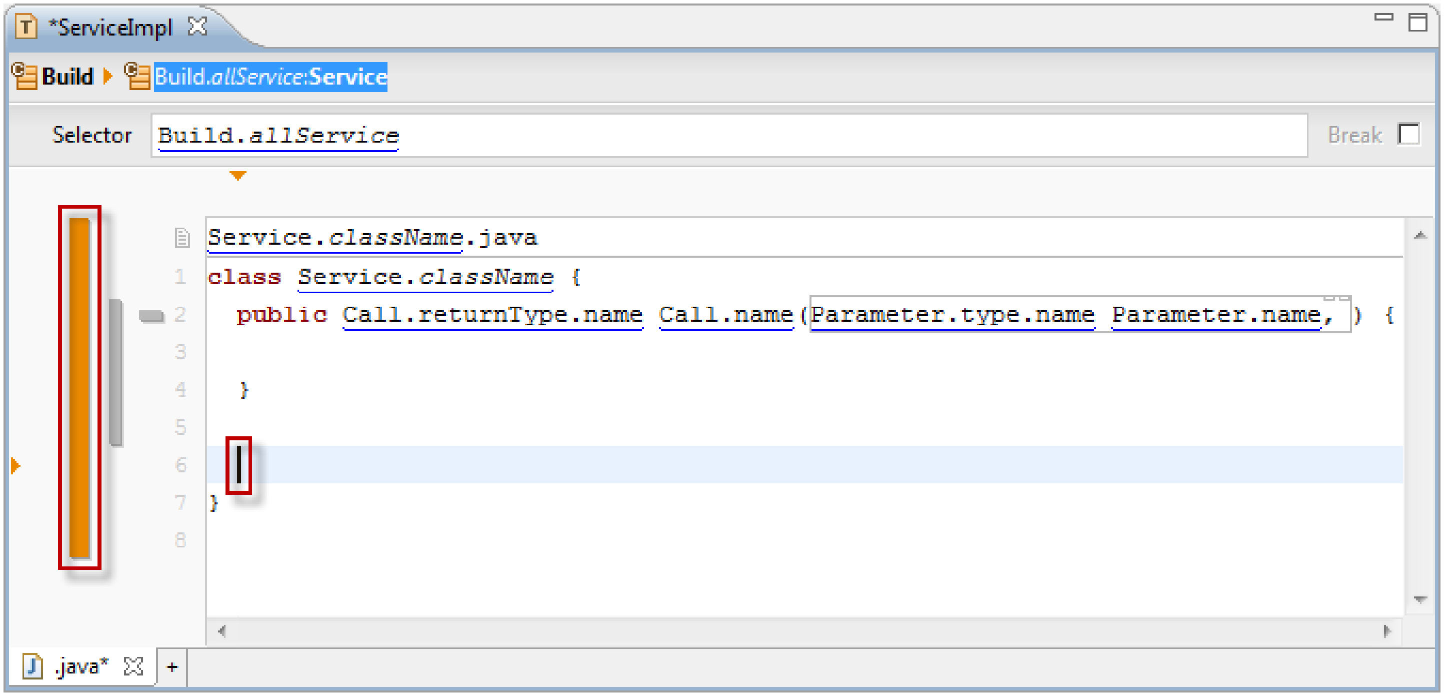


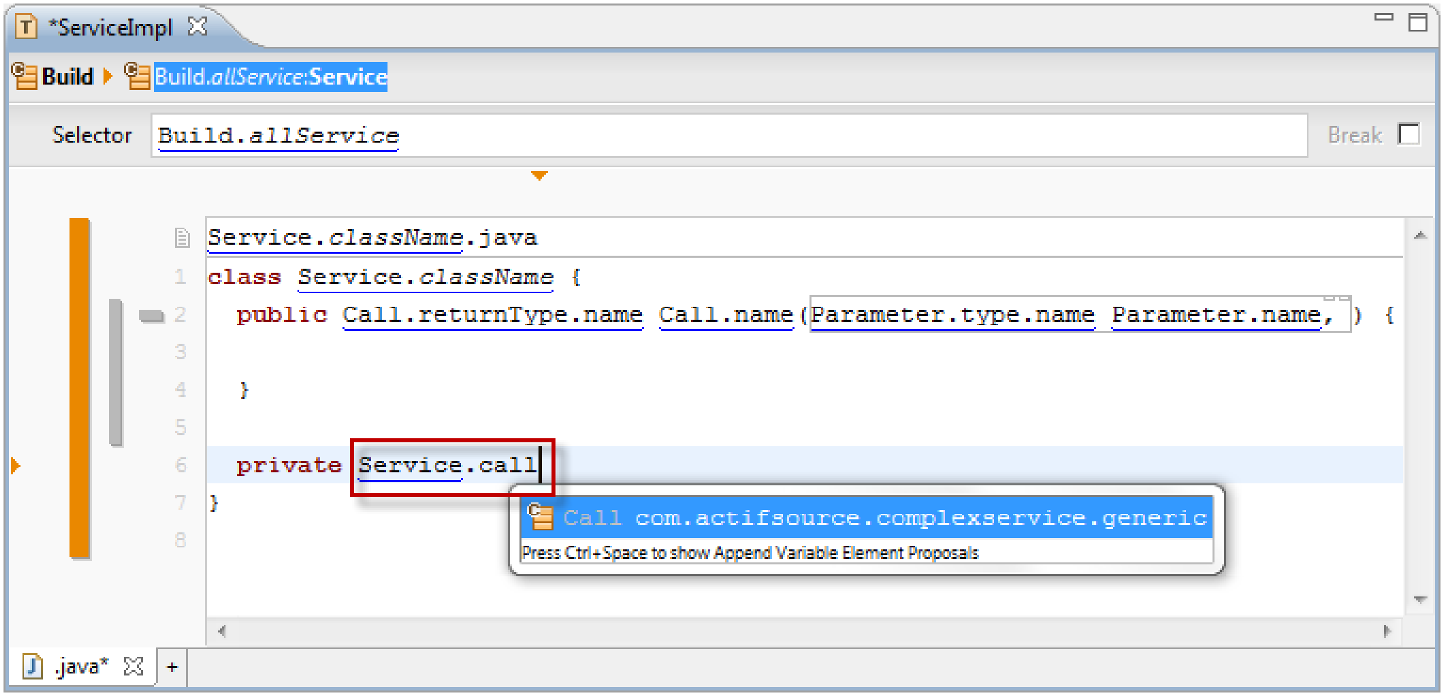
```
Build.allService
```

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }


}
```

Press Enter

A new line has been added in the Parent **Context**

Add Context via Quick Assist



```
Build.allService
```

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Service.call
}
```

```
Call com.actifsource.complexservice.generic
Press Ctrl+Space to show Append Variable Element Proposals
```

ⓘ Let's look at a quick and easy way to insert a new **Context**

↳ Insert the **Variable** Service.call using **Content Assist** (Ctrl+Space)

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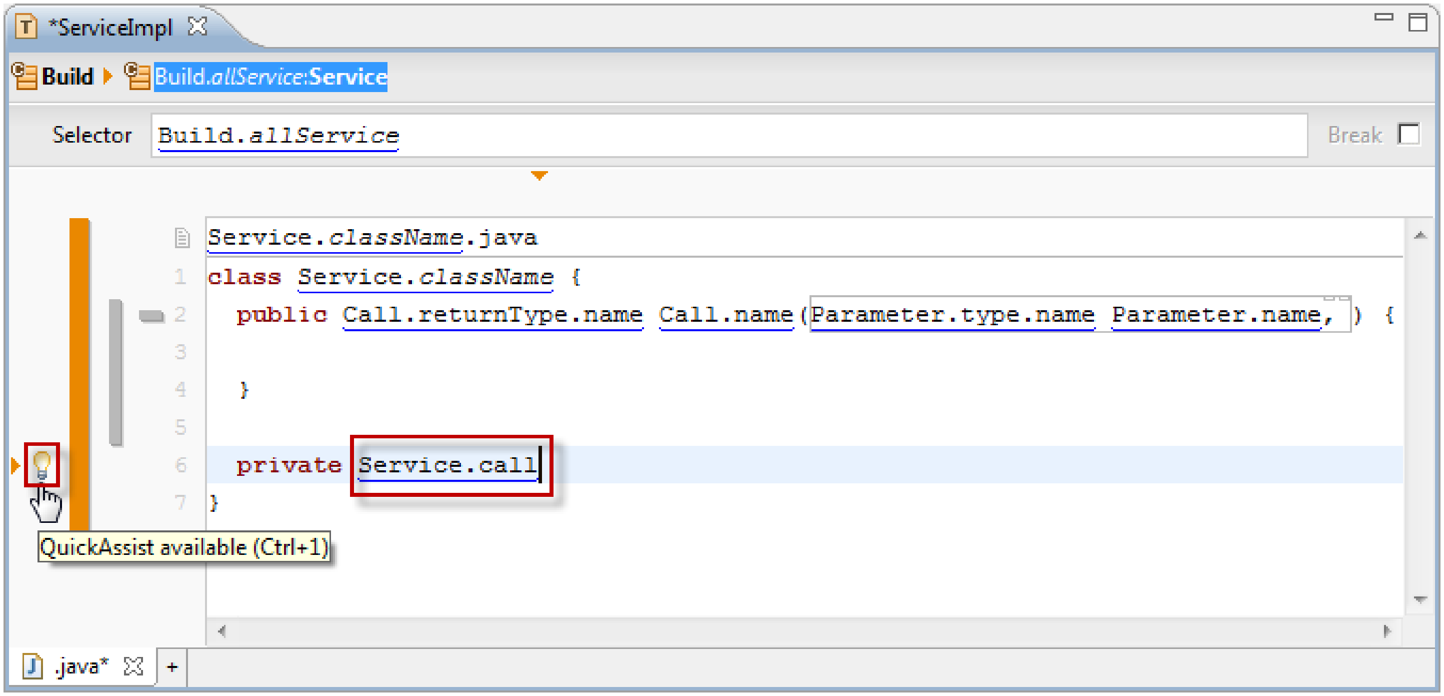
Add Context via Quick Assist



```
Build.allService
```

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Service.call
}
```

ⓘ The light bulb at the left hand indicates **Quick Assist** is available

↳ Activate **QuickAssist** by clicking the light bulb or pressing Ctrl+1

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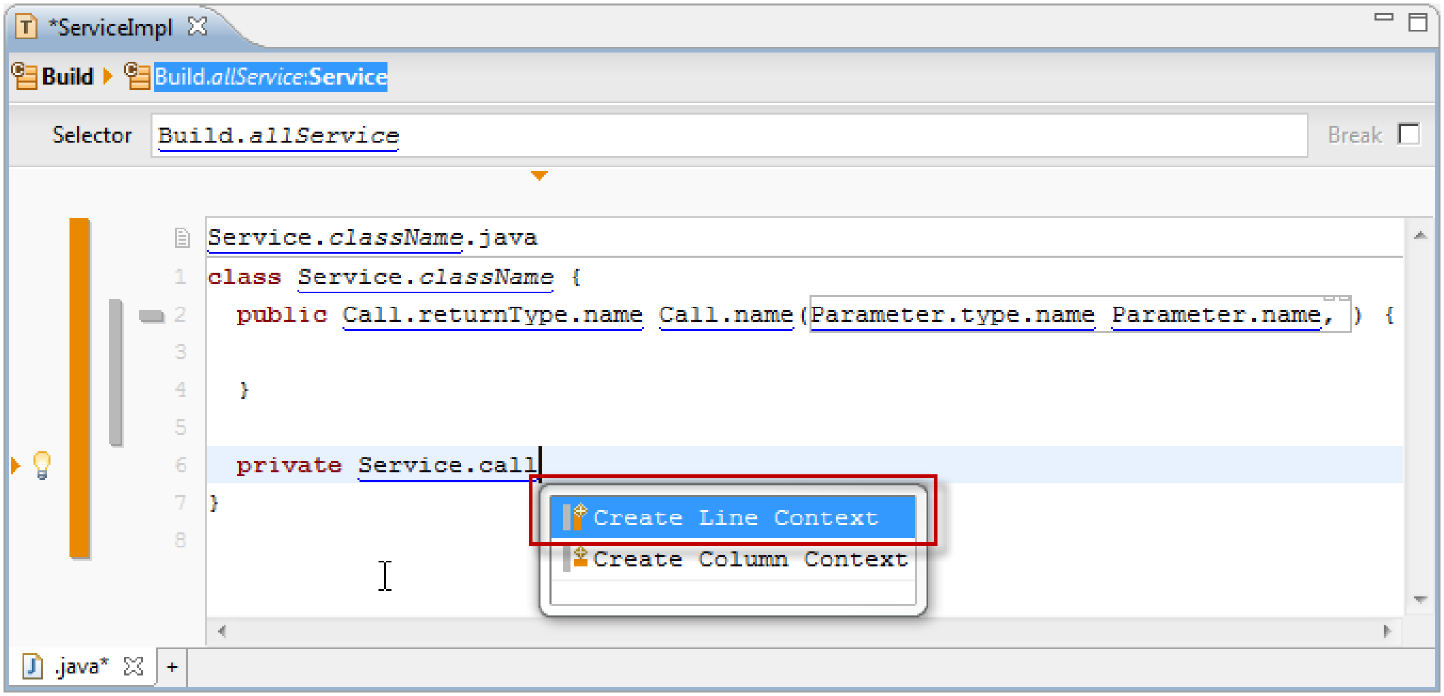
Add Context via Quick Assist



```
Build.allService
```

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Service.call
}
```

↳ Click on *Create Line Context*

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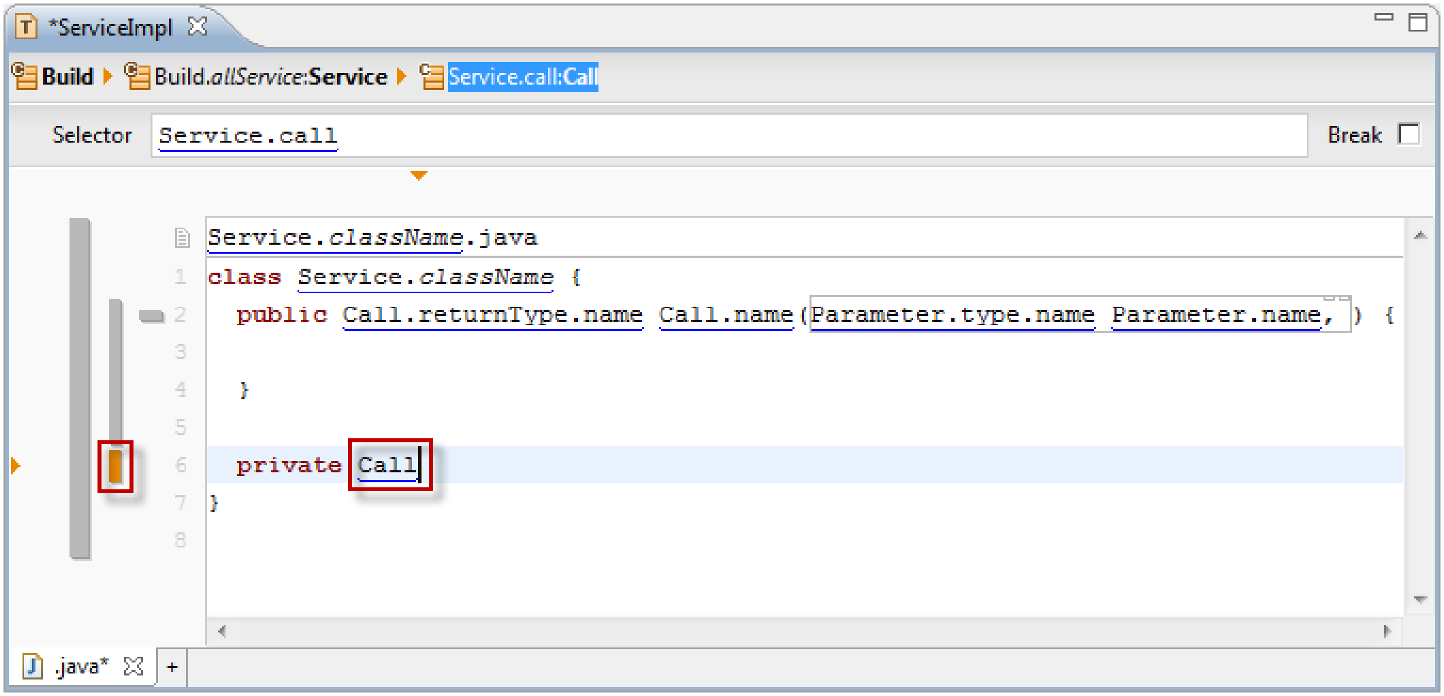
Add Context via Quick Assist



Selector: Service.call

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Call
}
```

ⓘ Note that a new Call **Context** (**Selector**: Service.call) has been added

ⓘ The Variable Service.call has been replaced by Call

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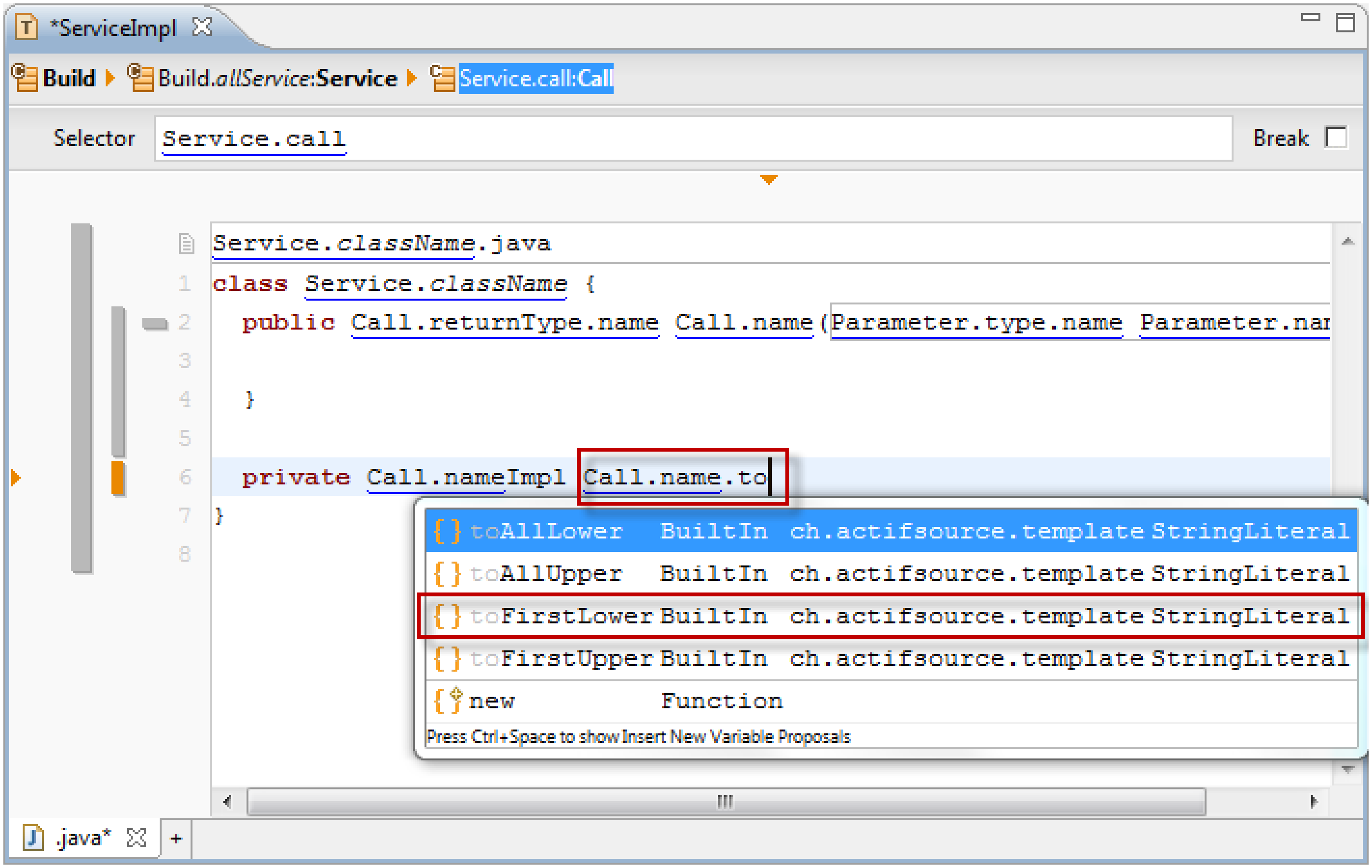
Built-In Functions


*ServiceImpl

Build ▸ Build.*allService*:Service ▸ Service.call:Call

Selector `Service.call` Break ☐

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.nar

  }

  private Call.nameImpl Call.name.to
}
```

```
{} toAllLower   BuiltIn  ch.actifsource.template StringLiteral
{} toAllUpper   BuiltIn  ch.actifsource.template StringLiteral
{} toFirstLower BuiltIn  ch.actifsource.template StringLiteral
{} toFirstUpper BuiltIn  ch.actifsource.template StringLiteral
{} new          Function
Press Ctrl+Space to show Insert New Variable Proposals
```

.java*

ⓘ Let’s use **Built-In Functions** on **Attributes**

Press '.' (dot) and **Content Assist** (Ctrl+Space) after <u>**name**</u> to see all available **Built-In Functions**

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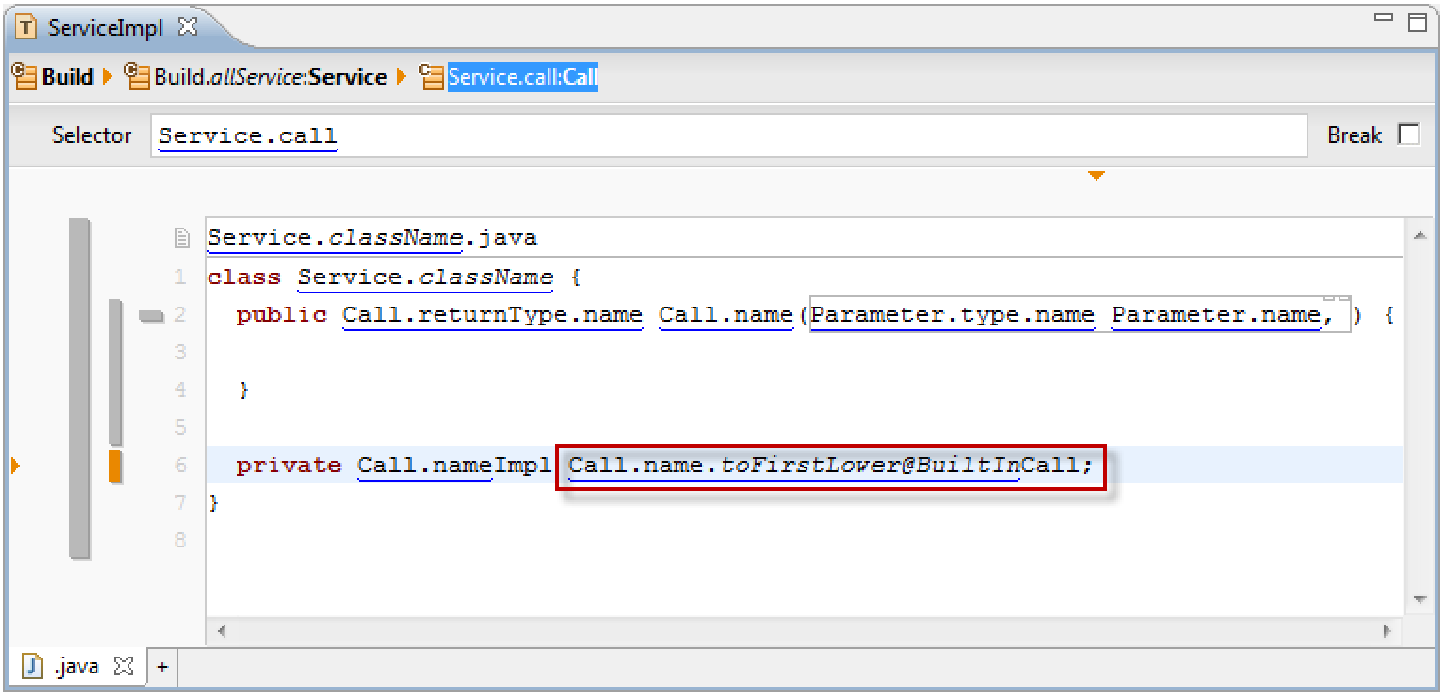
Built-In Functions



ServiceImpl

Build ▸ Build.*allService*:Service ▸ Service.call:Call

Selector `Service.call` Break ☐

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Call.nameImpl Call.name.toFirstLower@BuiltInCall;
}
```

.java +

↳ Complete the member variable declaration as shown above

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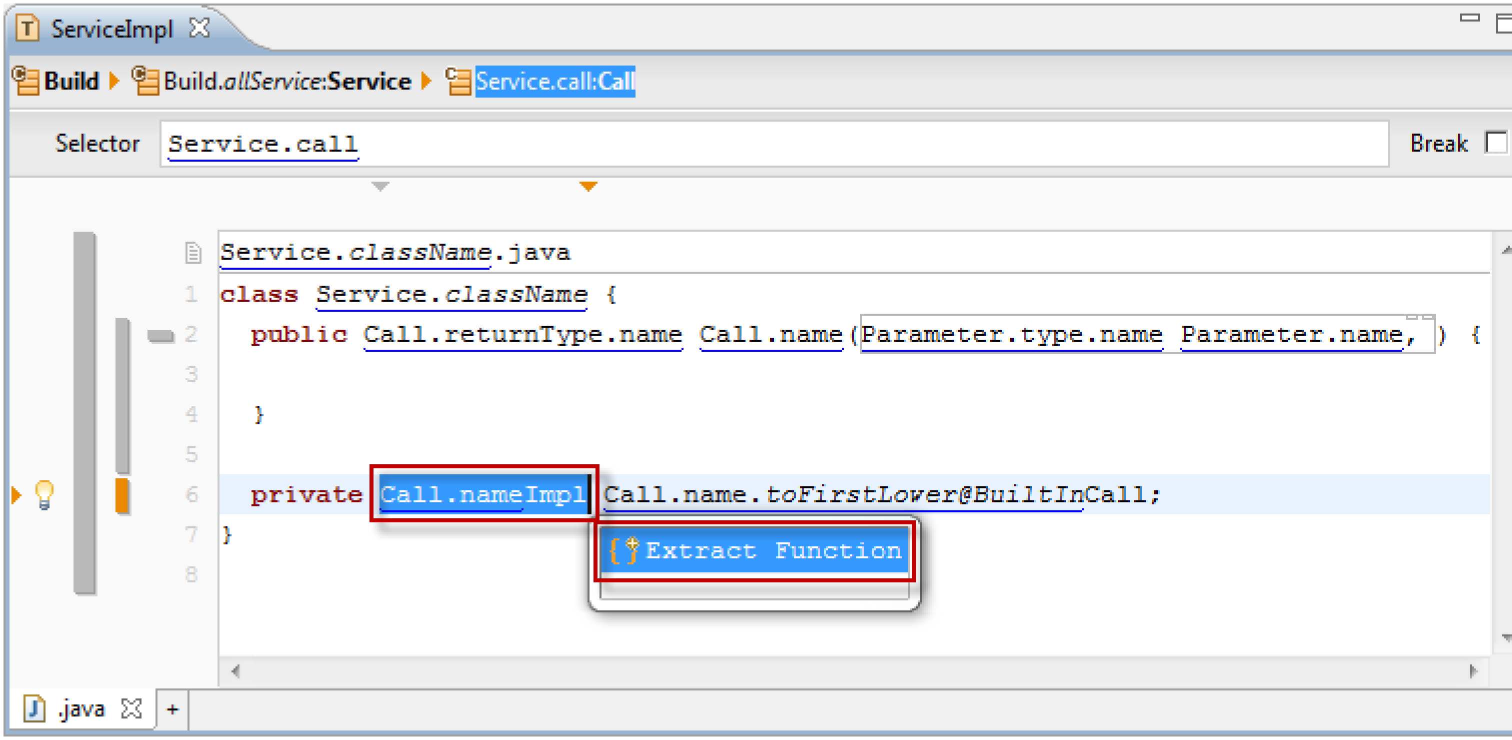
Extract Function in Function Space



Service.call

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Call.nameImpl Call.name.toFirstLower@BuiltInCall;
}
```

ⓘ Call.nameImpl shall be the name of a new Template

↳ Select the term Call.nameImpl

↳ Activate **QuickAssist** by clicking on the light bulb or pressing Ctrl+1

↳ Click *Extract Function*

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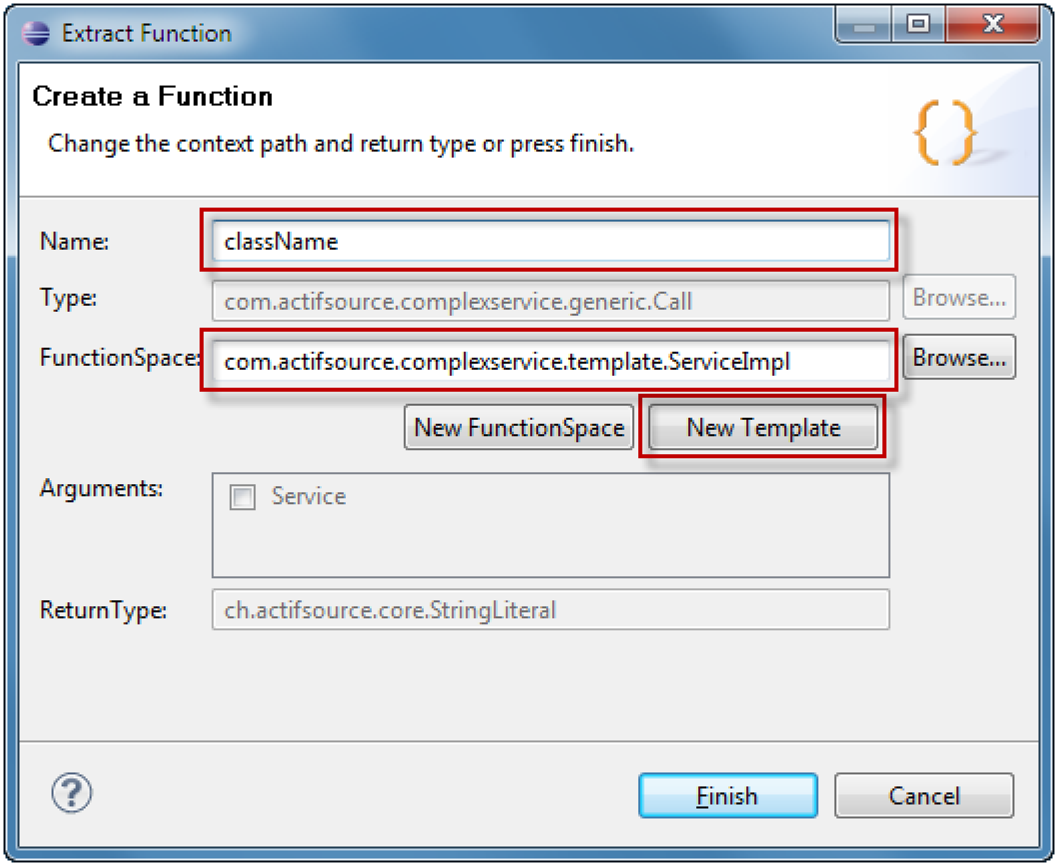
Extract Function in Function Space



Create a Function

Change the context path and return type or press finish.

Name: className

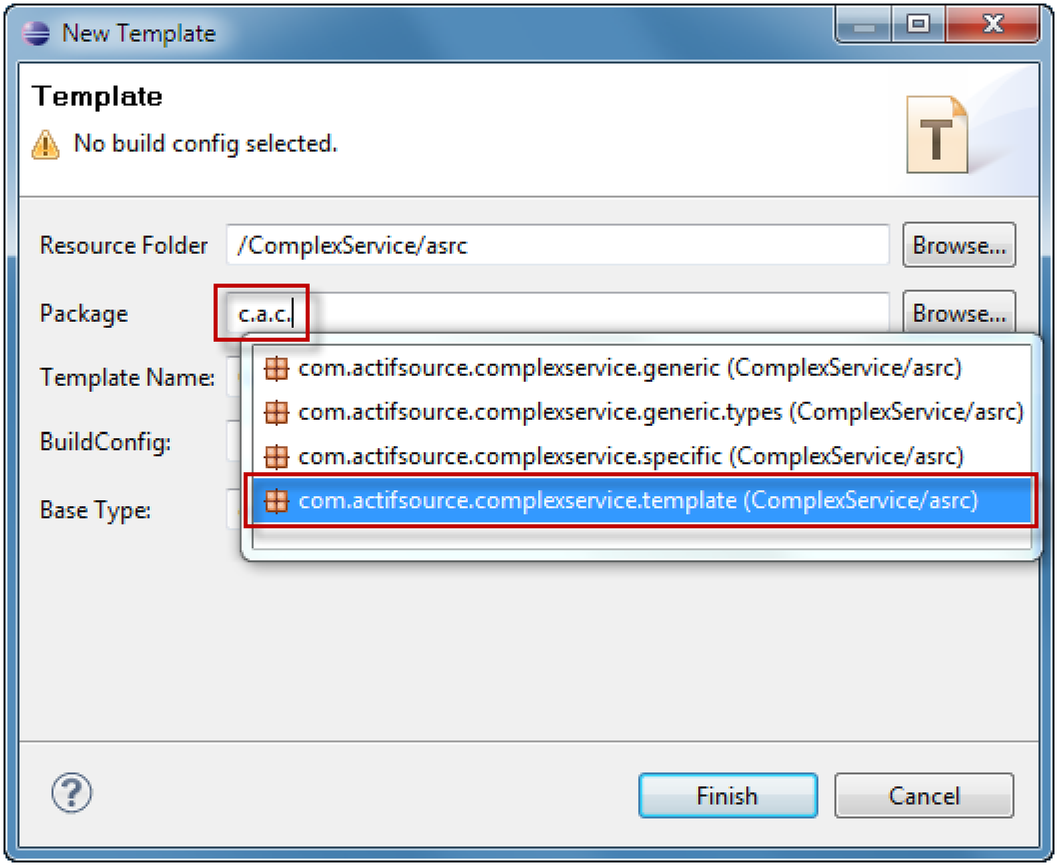
Type: com.actifsource.complexservice.generic.Call

FunctionSpace: com.actifsource.complexservice.template.ServiceImpl

Arguments: ☐ Service

ReturnType: ch.actifsource.core.StringLiteral

- Name the function `className`
- ⓘ Note that the default **Function Space** for this new function is the **Template** *ServiceImpl*
- Click *New Template* to create a new template which acts as **Function Space** for the new function *className*



Resource Folder /ComplexService/asrc

Package c.a.c.

Template Name:

BuildConfig:

Base Type:

com.actifsource.complexservice.generic (ComplexService/asrc)
com.actifsource.complexservice.generic.types (ComplexService/asrc)
com.actifsource.complexservice.specific (ComplexService/asrc)
com.actifsource.complexservice.template (ComplexService/asrc)

↳ Select the **Package** for the new **Template** as shown above using **Content Assist** (Ctrl+Space) or the *Browse…* button

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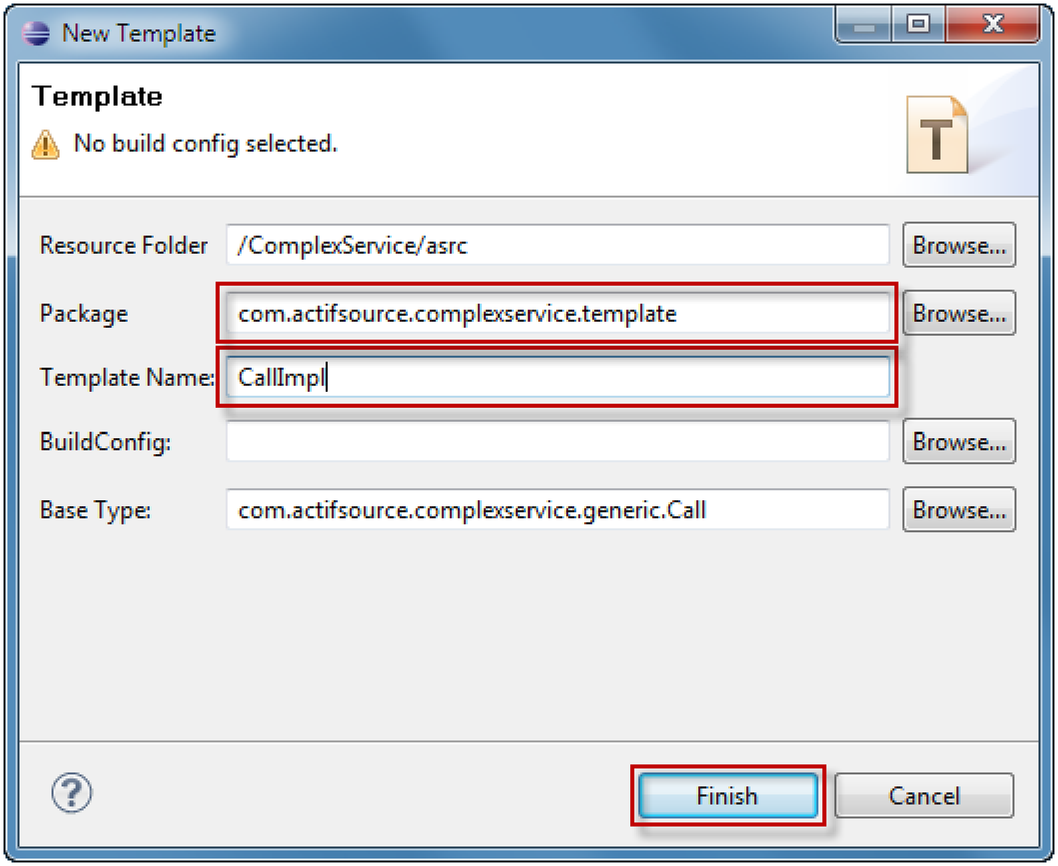

Resource Folder: /ComplexService/asrc
Package: com.actifsource.complexservice.template
Template Name: CallImpl
BuildConfig:
Base Type: com.actifsource.complexservice.generic.Call

- ⓘ Check the **Package**
- ↳ Name the **Template** `CallImpl`
- ↳ Press *Finish*

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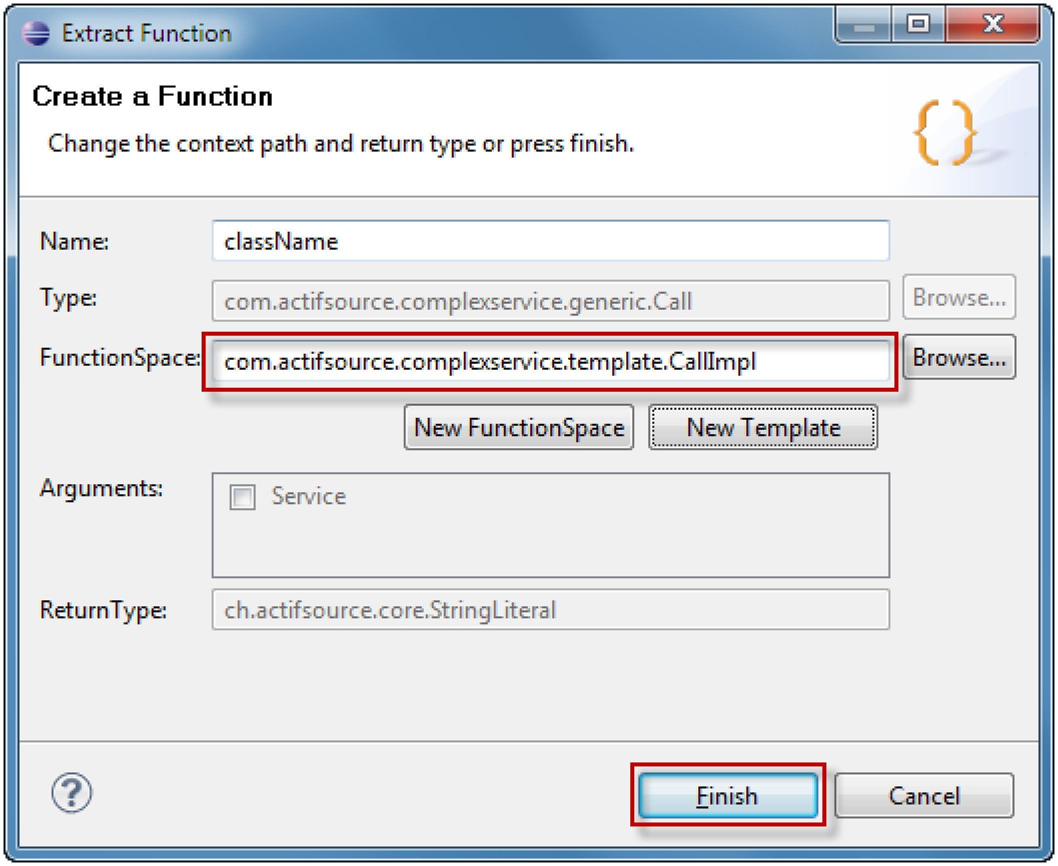

Create a Function

Change the context path and return type or press finish.

Name: className

Type: com.actifsource.complexservice.generic.Call

FunctionSpace: com.actifsource.complexservice.template.CallImpl

Arguments: ☐ Service

ReturnType: ch.actifsource.core.StringLiteral

ⓘ Note that the **Function Space** has been changed from *ServiceImpl* to *CallImpl*

↳ Press *Finish*

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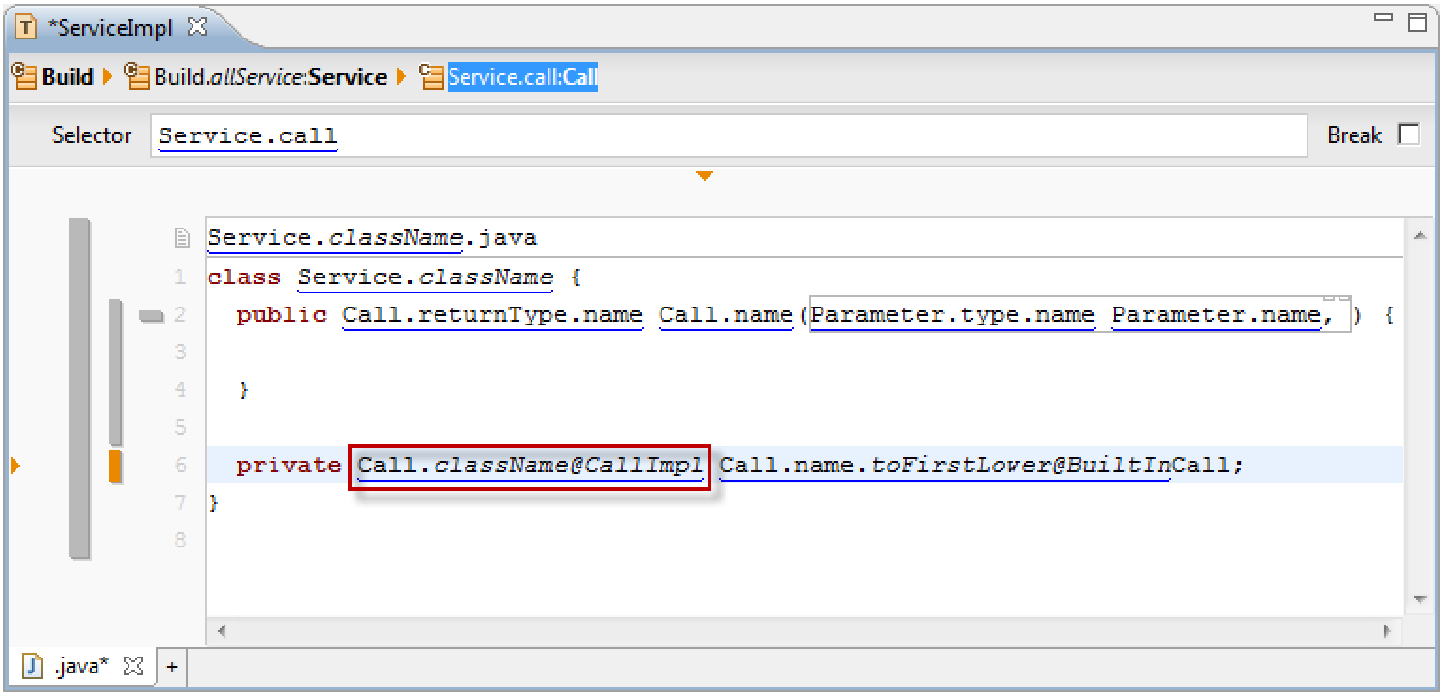
Extract Function in Function Space



Selector: Service.call

```
Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Call.className@CallImpl Call.name.toFirstLower@BuiltInCall;
}
```

ⓘ The Term Call.nameImpl has been replaced by Call.*className@CallImpl*

ⓘ *className@CallImpl* indicates that the **Function** *className* belongs to the **Function Space** CallImpl

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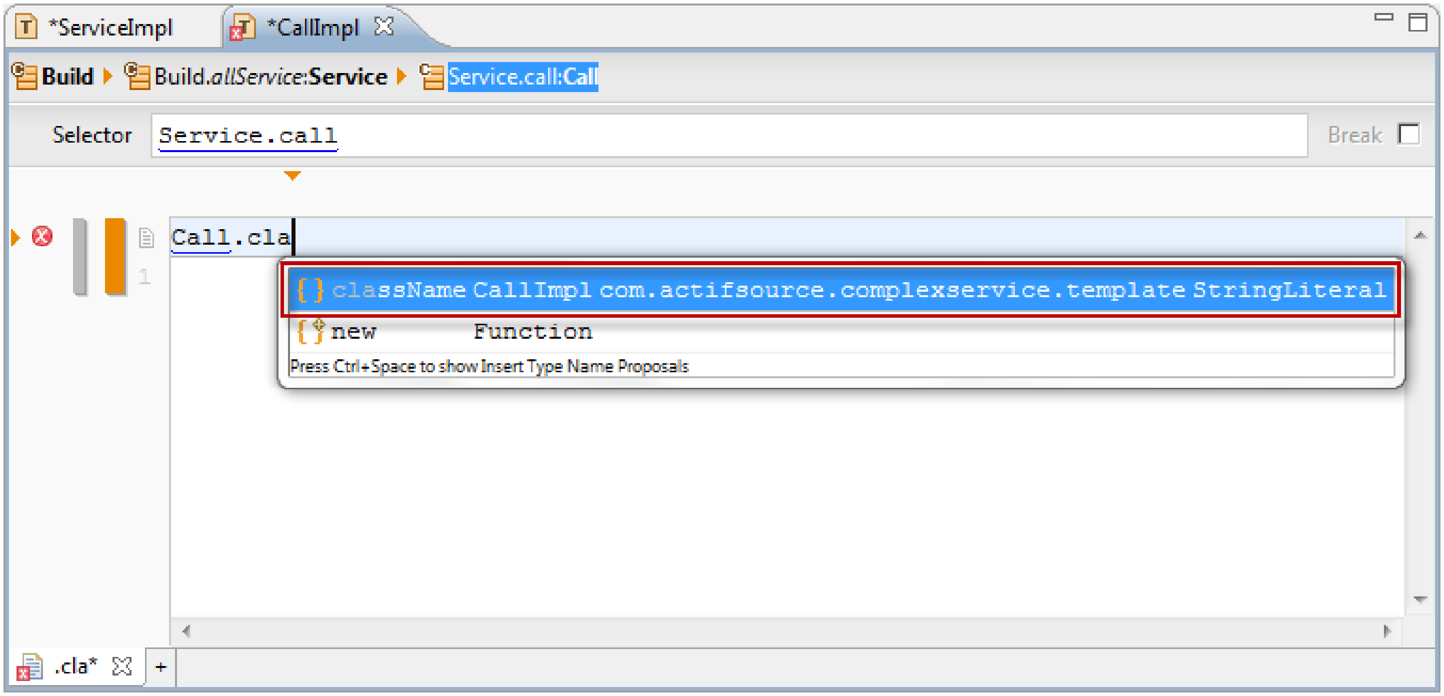
Extract Function in Function Space



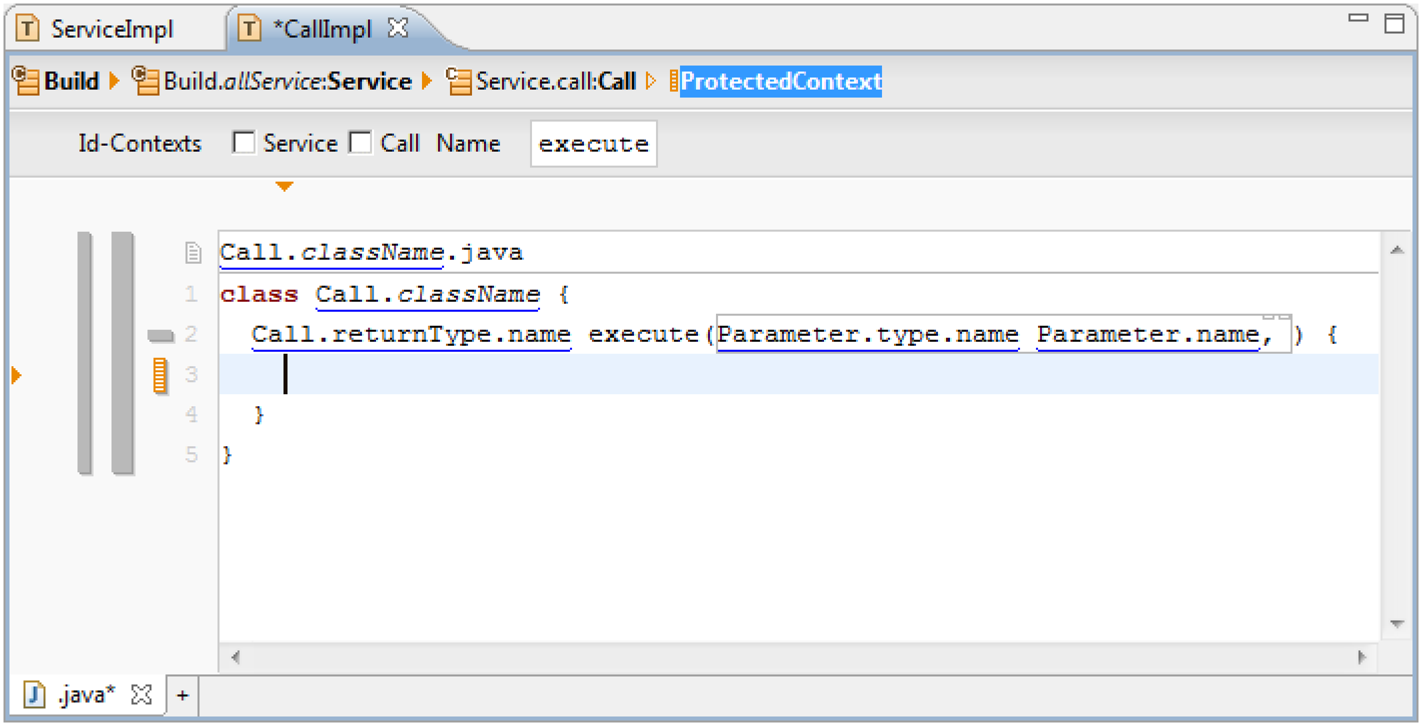
```
Service.call
Call.cla
{ } className CallImpl com.actifsource.complexservice.template StringLiteral
{ } new        Function
Press Ctrl+Space to show Insert Type Name Proposals
```

ⓘ A new **Template** named *CallImpl* has been created in the **Package** *template*

↳ Use the **Function** *className* in the file line of your template

ⓘ Note that *className* is the **Function** which we extracted in the **template** *ServiceImpl* before

Extract Function in Function Space

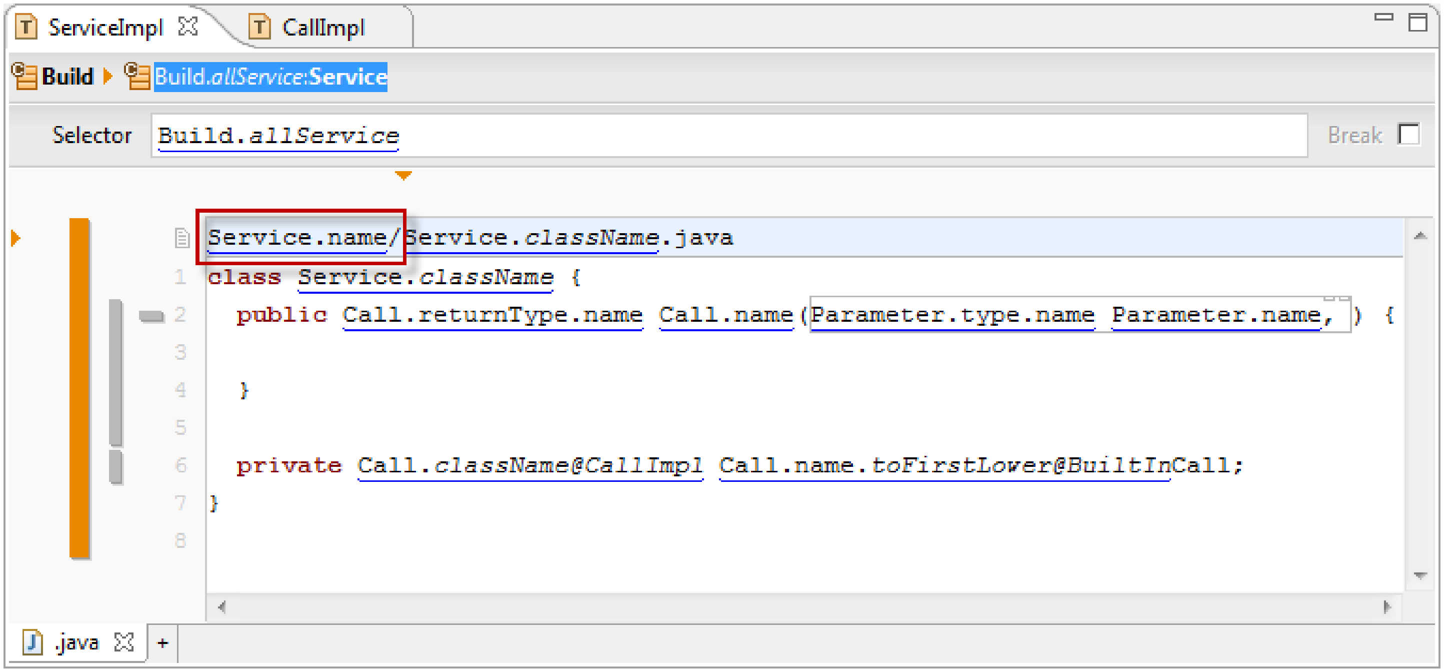


execute

```
Call.className.java
class Call.className {
  Call.returnType.name execute(Parameter.type.name Parameter.name, ) {
    
  }
}
```

- Write a simple class as shown above
- Write a method *execute* with returnType and Parameter
- Place a **Protected Context** in the function body

Templates and Folders



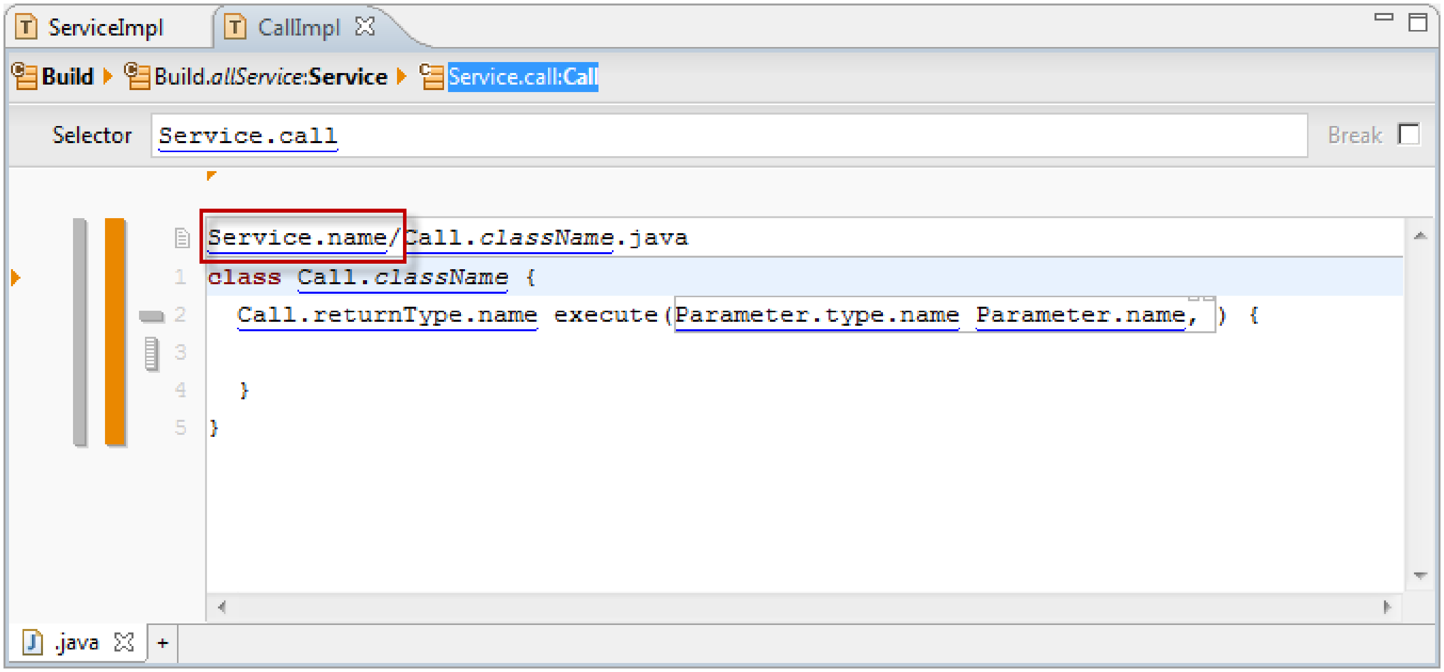
```
Build.allService
```

```
Service.name/Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Call.className@CallImpl Call.name.toFirstLower@BuiltInCall;
}
```

- ⓘ Generated artifacts are placed in the **Target Folder** of your project
- ⓘ You may want to place generated artifacts in specific sub folders
- ↳ Add Service.name/ as folder information in the file line of the **Template** *ServiceImpl* as shown above



Selector: `Service.call`

```
Service.name/Call.className.java
class Call.className {
  Call.returnType.name execute(Parameter.type.name Parameter.name, ) {

  }
}
```

- ⓘ We want all Call implementations to be generated in the same folder as their corresponding Service
- ↳ Add Service.name/ as the folder name in the file line of the Template CallImpl as shown above
- ↳ Save the **Templates** *CallImpl* and *ServiceImpl*
- ⓘ Note that files generated from this template are moved to the new location automatically
- ⓘ **Protected Regions** of the generated files are preserved

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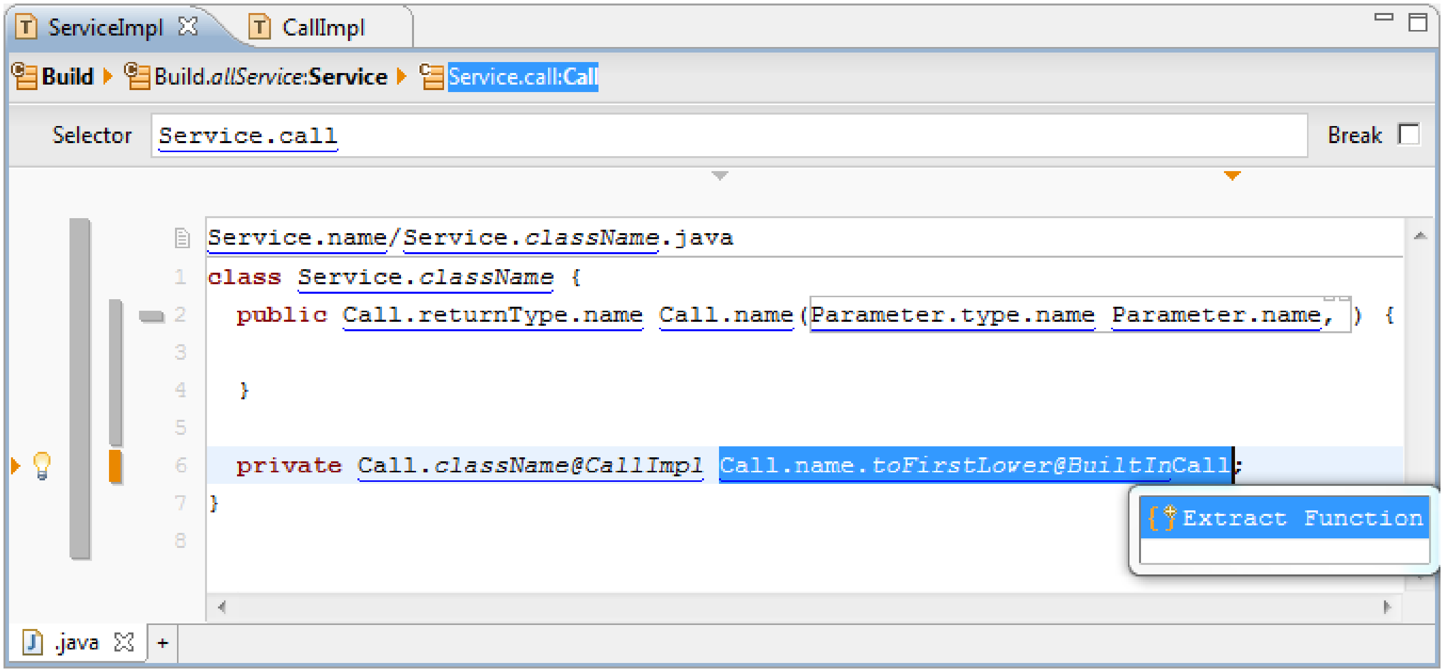
Copy with Context



```
Service.call
```

```
Service.name/Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {

  }

  private Call.className@CallImpl Call.name.toFirstLower@BuiltInCall;
}
```

- Extract a function *memberName* for the member variable name

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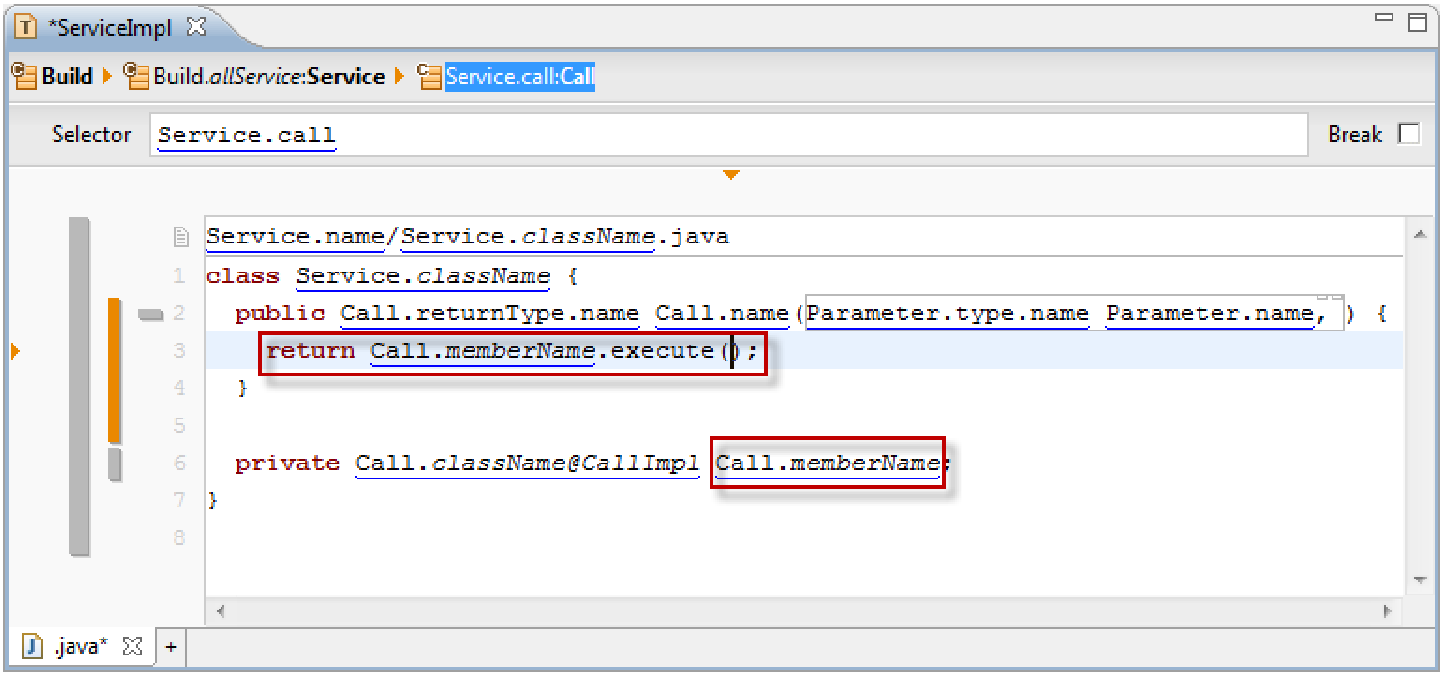
Copy with Context



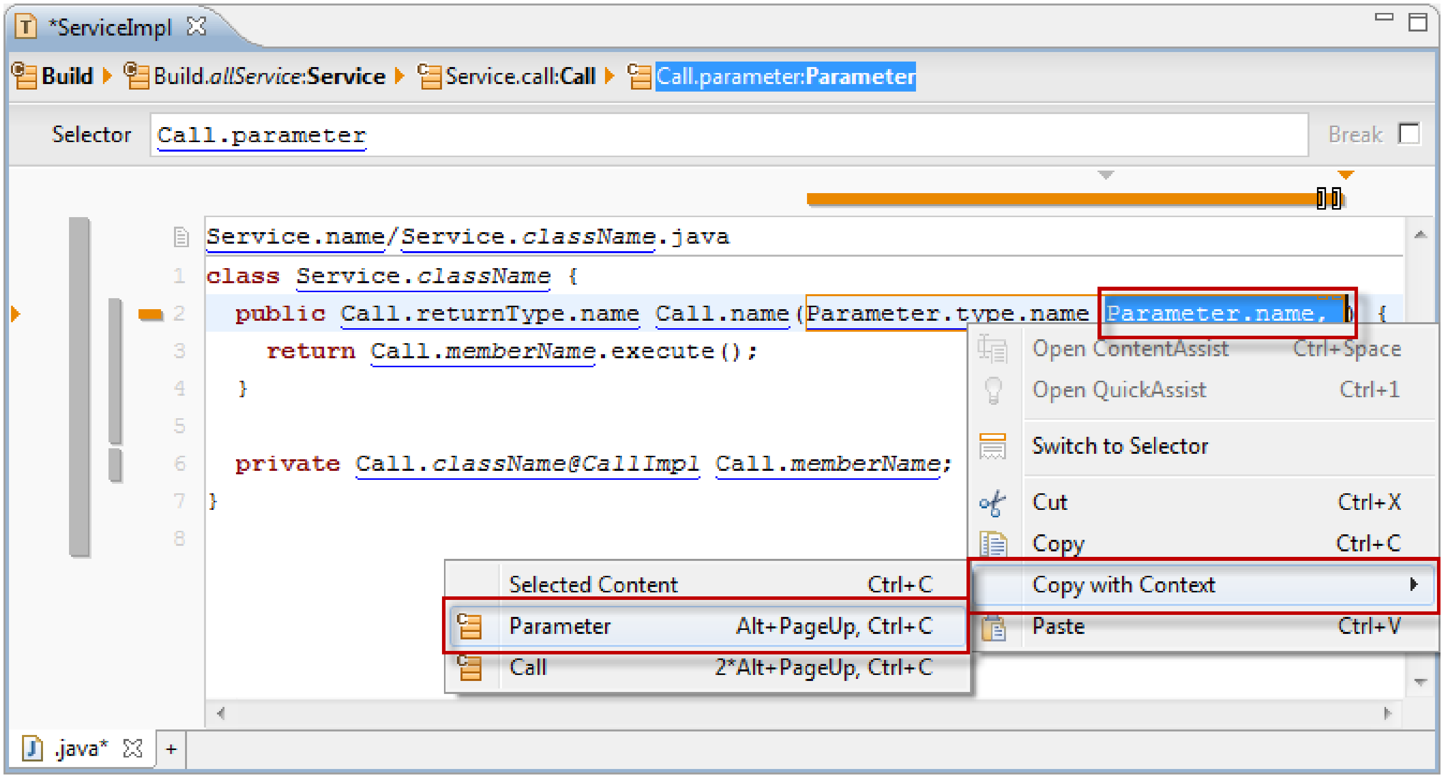
Selector: Service.call

```
Service.name/Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {
    return Call.memberName.execute();
  }

  private Call.className@CallImpl Call.memberName;
}
```

↳ Also use the function *memberName* in the function body as shown above

Copy with Context



```
Service.name/Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {
    return Call.memberName.execute();
  }

  private Call.className@CallImpl Call.memberName;
}
```

*ServiceImpl
Build ▸ Build.allService:Service ▸ Service.call:Call ▸ Call.parameter:Parameter
Selector Call.parameter
Break
Open ContentAssist Ctrl+Space
Open QuickAssist Ctrl+1
Switch to Selector
Cut Ctrl+X
Copy Ctrl+C
Copy with Context
Paste Ctrl+V
Selected Content Ctrl+C
Parameter Alt+PageUp, Ctrl+C
Call 2*Alt+PageUp, Ctrl+C
.java*

ⓘ We want to copy Parameter.name including the Parameter **Context** and the separating comma from the functions parameter list

↳ Select the Term "`Parameter.name, `"

↳ From the *Context Menu*, select *Copy with Context*

↳ From the *Subcontext Menu*, select Parameter

ⓘ Note also the shortcuts Alt+PageUp to select the parent context, and ; Ctrl+C to copy a context

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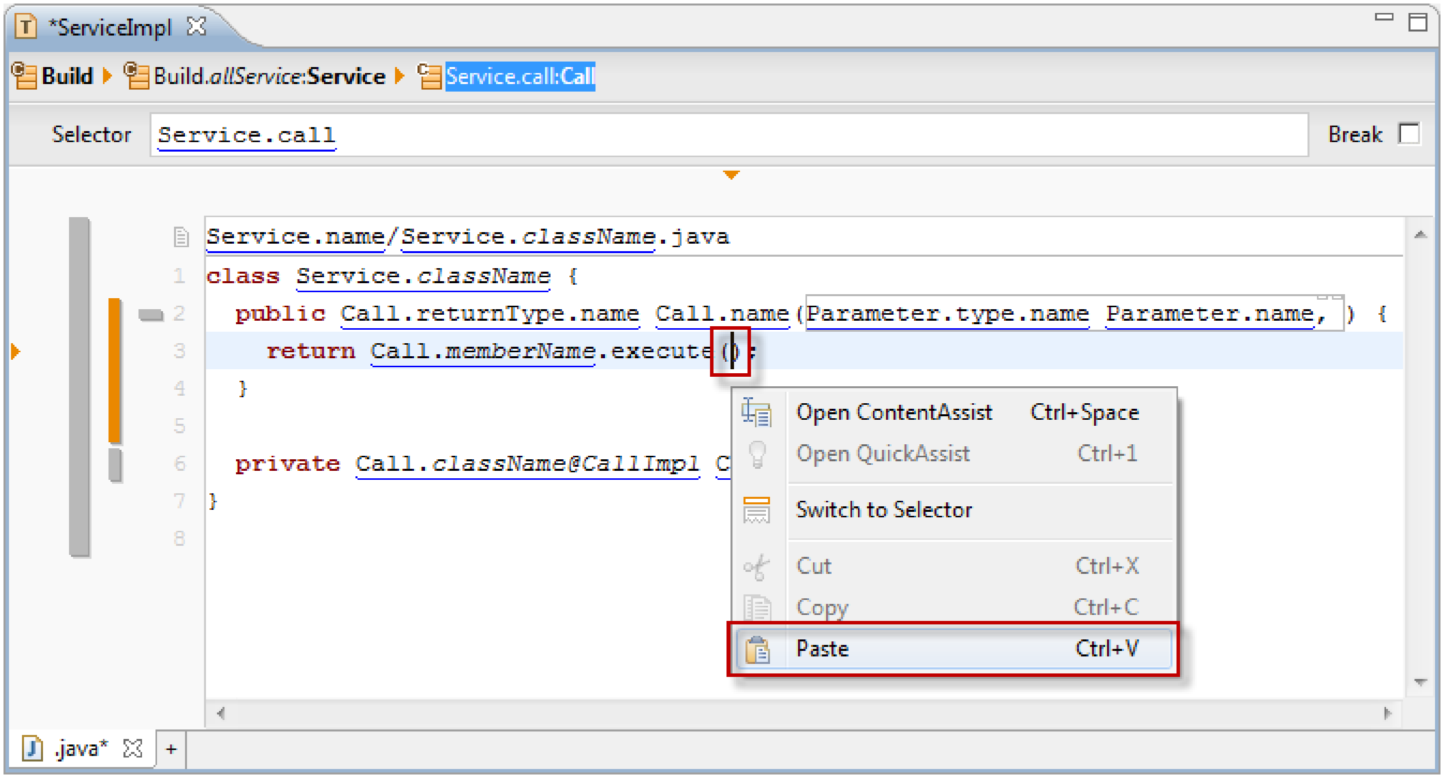


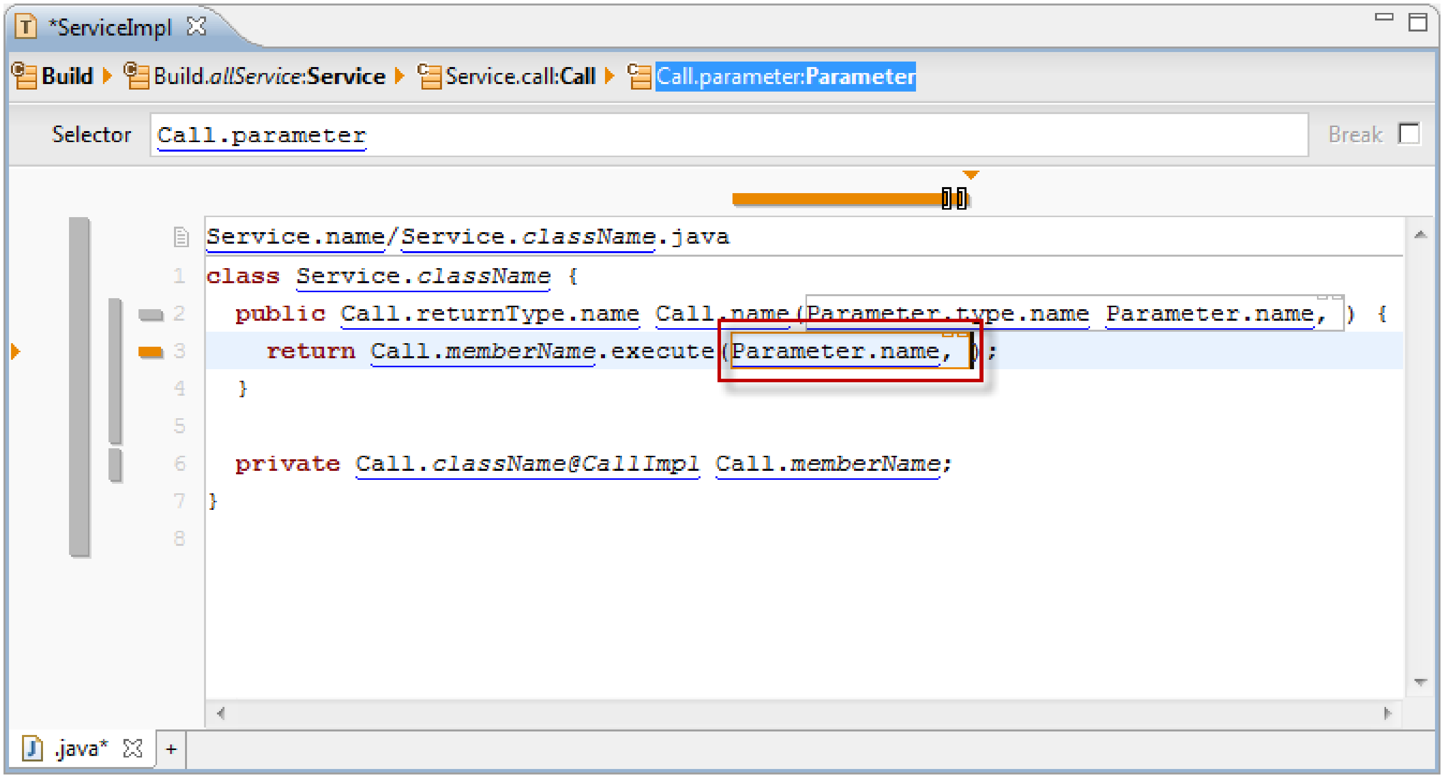
Selector: Service.call

```
Service.name/Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {
    return Call.memberName.execute();
  }

  private Call.className@CallImpl C
}
```

- Place your cursor between the brackets
- Select *Paste* from the *Context Menu* (Ctrl+V)

Copy with Context



Selector: `Call.parameter`

```
Service.name/Service.className.java
class Service.className {
  public Call.returnType.name Call.name(Parameter.type.name Parameter.name, ) {
    return Call.memberName.execute(Parameter.name, );
  }

  private Call.className@CallImpl Call.memberName;
}
```

ⓘ The text and its corresponding context are inserted

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