PerConIK

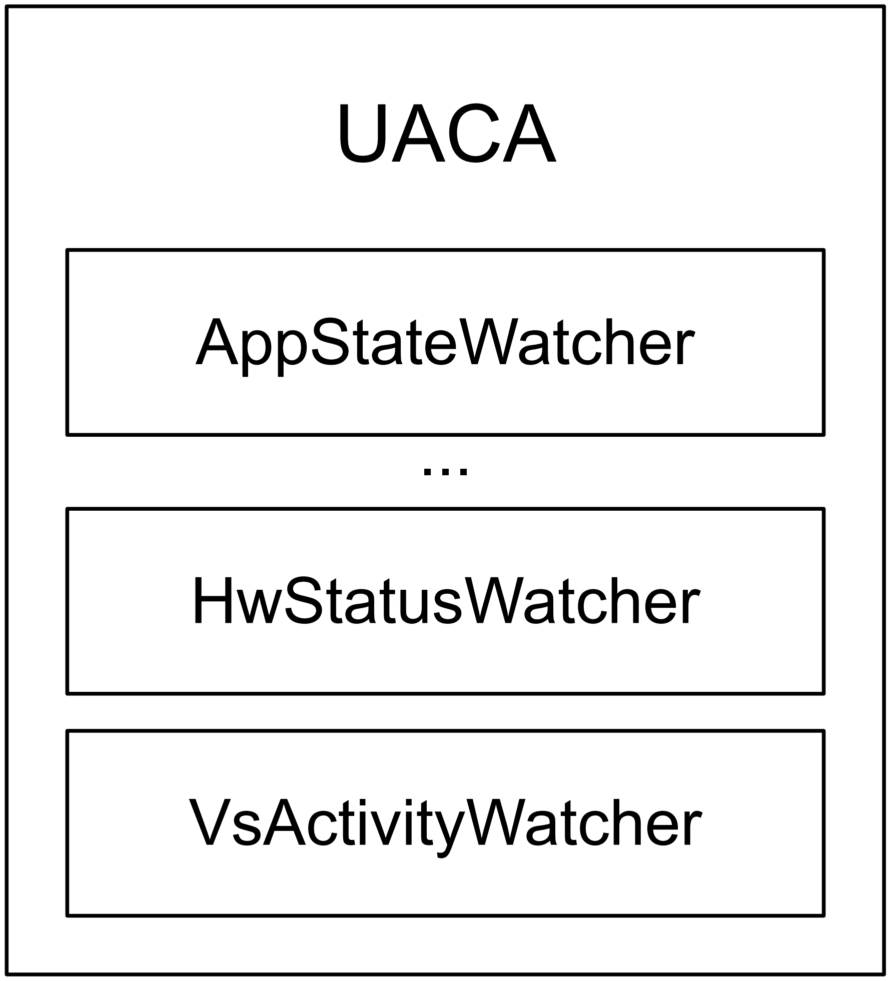
Monitoring Programmer's Activity by means of an Extension to Eclipse

@pavolzbell

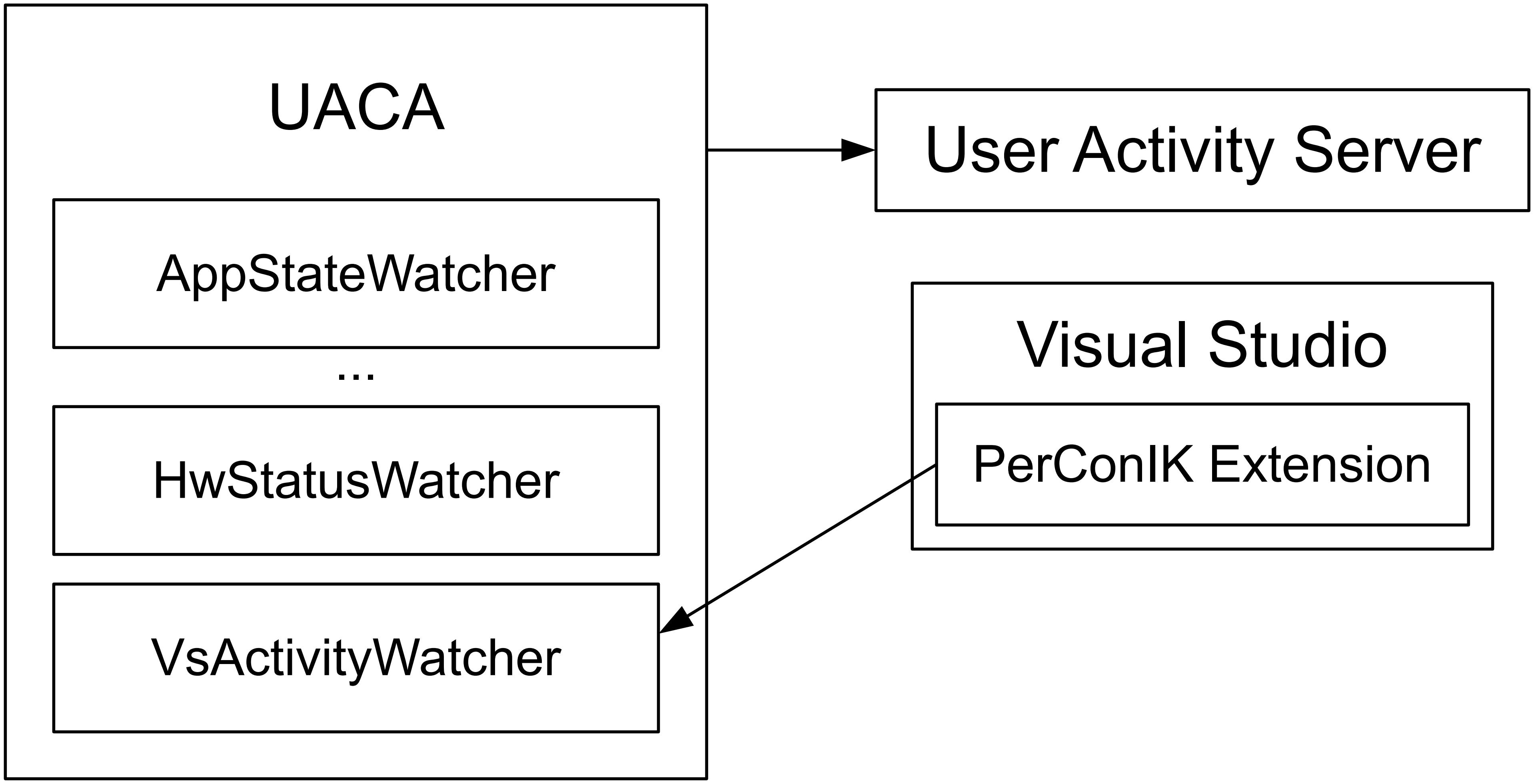
Project PerConIK

Research of methods for acquisition, analysis and personalized conveying of information and knowledge

Overview


UACA
AppStateWatcher
...
HwStatusWatcher
VsActivityWatcher

Overview


UACA
AppStateWatcher
...
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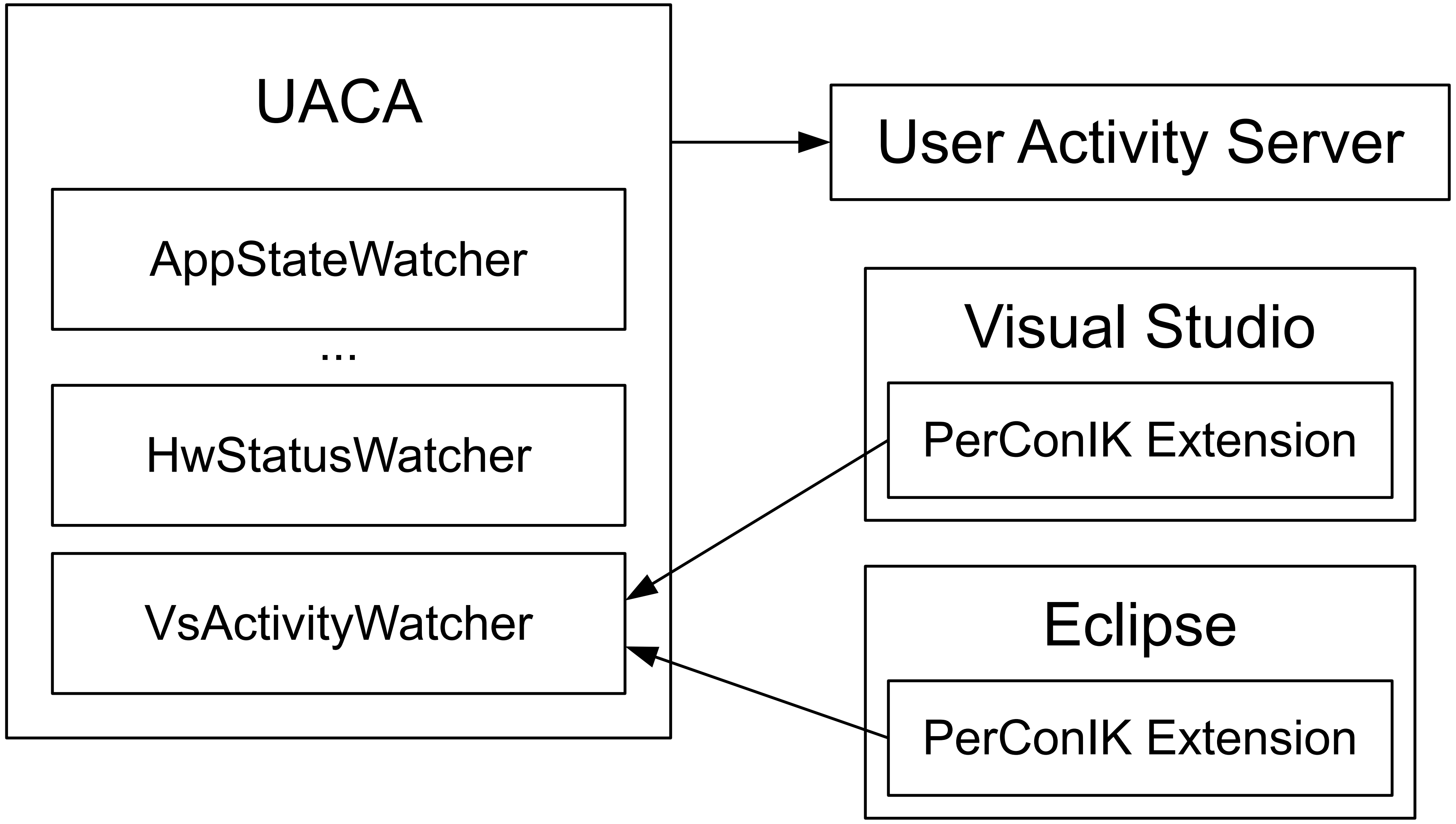
VsActivityWatcher
User Activity Server
Visual Studio
PerConIK Extension

Overview


UACA
AppStateWatcher
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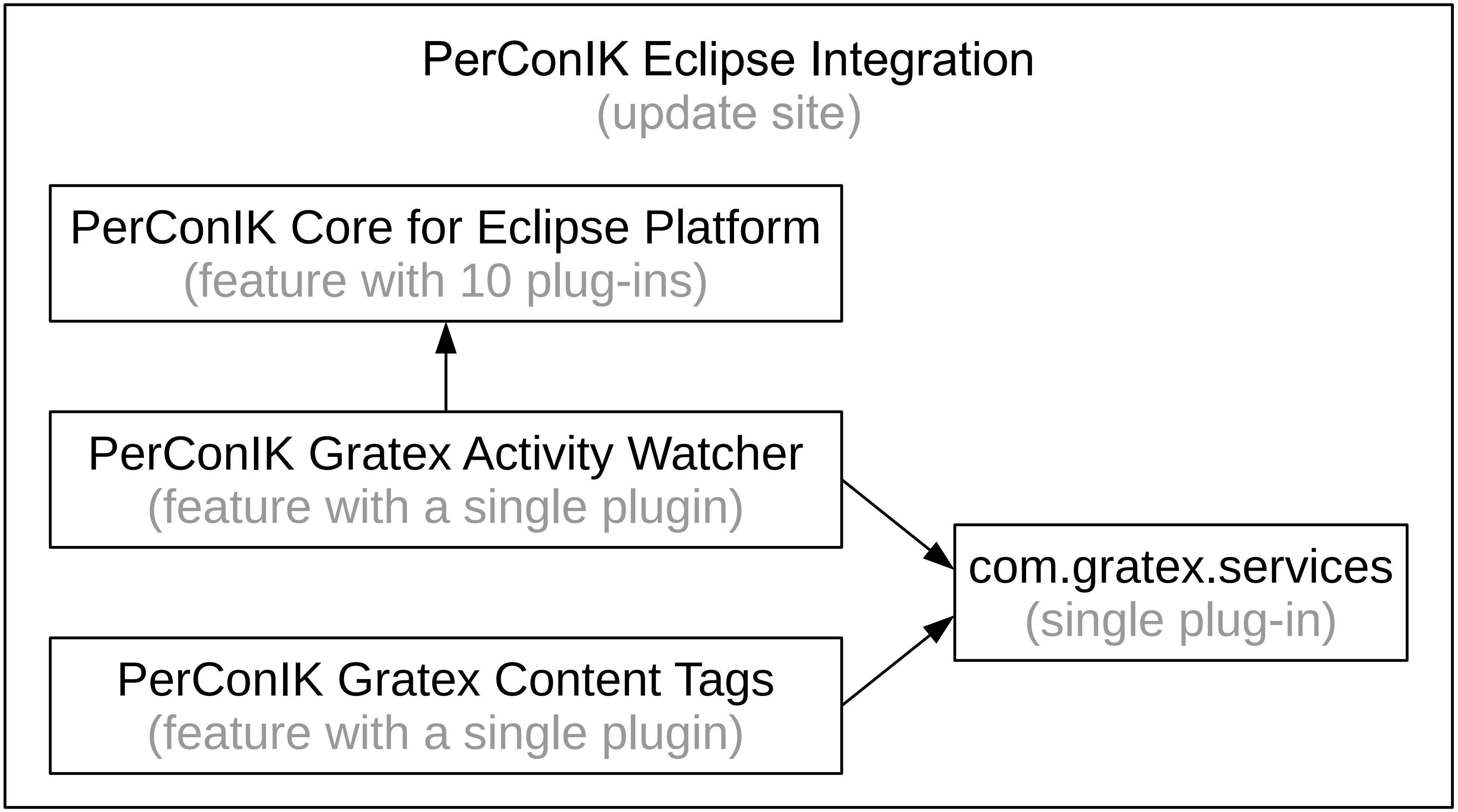
Visual Studio
PerConIK Extension
Eclipse
PerConIK Extension

Eclipse Features and Plug-ins


PerConIK Eclipse Integration
(update site)
PerConIK Core for Eclipse Platform
(feature with 10 plug-ins)
PerConIK Gratex Activity Watcher
(feature with a single plugin)
PerConIK Gratex Content Tags
(feature with a single plugin)
com.gratex.services
(single plug-in)

Core Features

- Support for 30 most used Eclipse listener interfaces
- Automatic listener management via plug-in ext.

  (automatic registration, startup & shutdown hooks, and more)
- Synchronized with UI threads
- Configurable at runtime
- Listener serialization and annotations
- Easy to use, both directly or via plug-in ext.

- Javadocs (http://perconik.github.io/docs)

Core Listeners

- package sk.stuba.fiit.perconik.core.listeners
- Java Elements (AST node changes), Git (repository changes)
- Resources (projects, packages, directories, files)
- Documents and File Buffers (low level, SWT like)
- Launches (run, debug), Refactorings (execution, history)
- Commands (execution), Operations (history)
- Selections (text, tree structure, marks), Search (files)
- Completitions, Debug Events, Test Runs, …
- Workbench, Windows, Pages, Parts, Perspectives

Core Plug-ins

- sk.stuba.fiit.perconik.core

  (listener interfaces, adapters and management in general)
- sk.stuba.fiit.perconik.core.java

  (AST APIs: transformations, filters, tokenization, difference, …)

- sk.stuba.fiit.perconik.eclipse (extensions to Eclipse APIs)
- sk.stuba.fiit.perconik.utilities (strings, enums, reflection)

- sk.stuba.fiit.perconik.{core.persistence, debug, environment, libraries, preferences, ui}

Core Libraries

- sk.stuba.fiit.perconik.libraries

- ANTLR 4.1 (ANother Tool for Language Recognition)
- java-diff-utils 1.2.1 (computing diffs, applying patches, …)
- Guava 15.0 (Google's libraries: collections, concurrency, …)
- JSR-305 2.0.1 (Annotations for Software Defect Detection)
- INTT (Identifier Name Tokenisation Tool)

Activity Watcher

- com.gratex.perconik.activity
- Reference implementation of core listener interfaces
- Listeners:
  - IdeCodeListener (code selections)
  - IdeCommitListener (commits using Git)
  - IdeDocumentListener (add, open, rename, save, switch to, …)
  - IdeProjectListener (add, open, refresh, switch to, …)
  - IdeStateListener (state changes)
  - IdeElementListener and IdeFindListener (not implemented yet)
- Implemented at UISI FIIT STU

Content Tags

- com.gratex.perconik.tag
- Update of the legacy ConMark plug-in
- Implemented at Gratex International

Services

- com.gratex.perconik.services
  - ActivitySvc
  - AstRcsWcfSvc
  - ITMService
  - TagProfileWcfSvc
  - VsActivityWatcherService (local to UACA)
- No need to generate DTOs again, reuse this plug-in!
  - Remember the PermGen, -XX:PermSize -XX:MaxPermSize
- Implemented at Gratex International

Under the Hood

- Class vs. instance based listener registering
- Listener registration hooks
- Resources – Low level listener registration handlers
- Dynamic singleton instance resolving
- Core Services (high level listener or resource management)

Class vs. Instance Based Listeners

Classic listener registration problem:

- Class based

```
JavaCore.addElementChangedListener(listener);
```

- Instance based

```
IDocument document = ...;
document.addDocumentListener(listener);
```

Class vs. Instance Based Listeners

Classic listener registration solution:

sk.stuba.fiit.perconik.{

debug.listeners.DocumentDebugListener@63faaf8b

core.resources.DocumentHook$WindowHook for debug.listeners.DocumentDebugListener@63faaf8b

core.resources.PartHook$PageHook for core.resources.EditorHandler$PartFilter for core.resources.DocumentHook$WindowHook for debug.listeners.DocumentDebugListener@63faaf8b

}

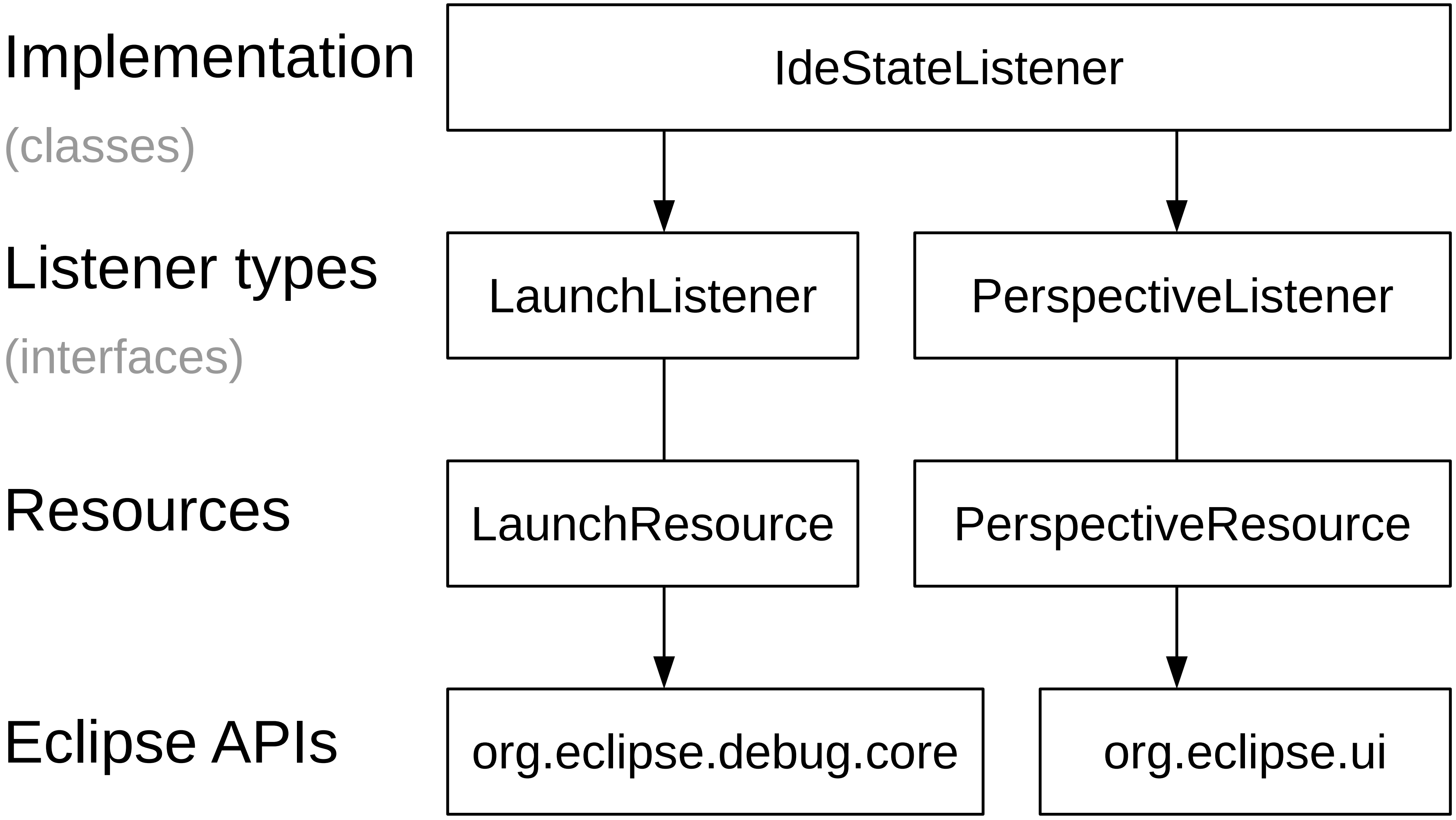
Listener Registration Hooks

- When to load or store listener caches?
- How to log events of type `OPEN` for files opened before listener registration?

- Invoked automatically during registration and unregistration on specified listener:

```
preRegister()      postRegister()
preUnregister()    postUnregister()
```

Listener Registration Handlers



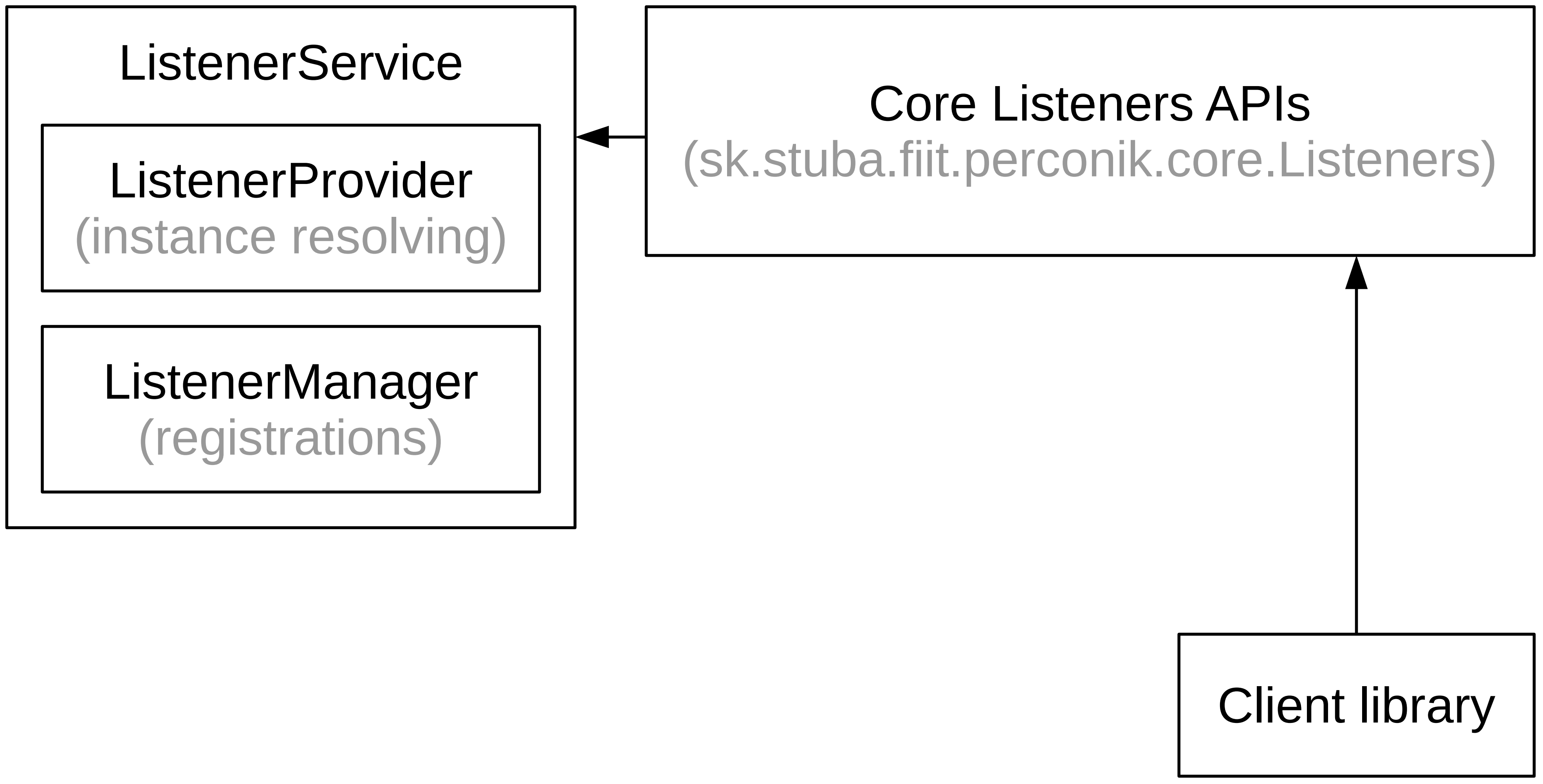
Dynamic Singleton Resolving

- Listeners must be singletons
- How to implement? What is the best way? (EJSE#3)

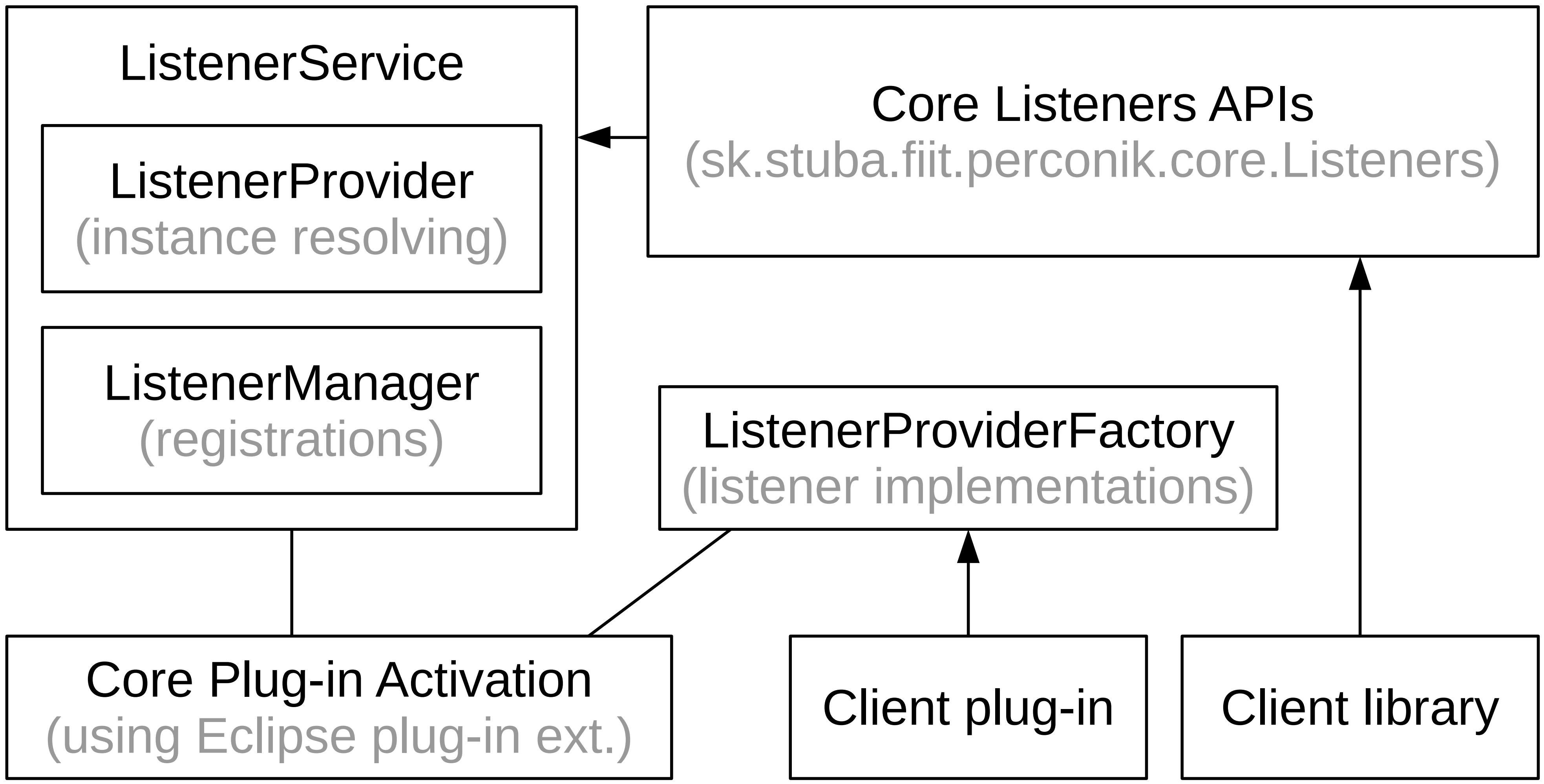
- Class based listener singleton instance lookup:
  - Enum constant `INSTANCE` (case insensitive)
  - Class method `getInstance` (`static`)
  - Class constant `INSTANCE` (case insensitive, `static final`)
  - Class constructor with no parameters (Java Beans style)
- Resolved instance is cached and reused

sk.stuba.fiit.perconik.utilities.reflect.accessor.DelayedLookup

Services and Plug-in Extensions



Services and Plug-in Extensions



(same for core resources – listener registration handlers)

Examples

```
Listener listener = new TextSelectionAdapter() {




};

Listeners.register(listener);
```

Examples

```
Listener listener = new TextSelectionAdapter() {
  public void selectionChanged(IWorkbenchPart part,
  ITextSelection selection) {
    System.out.println(selection.getText());
  }
};

Listeners.register(listener);
```

Examples

```
enum MyListener implements TextSelectionListener {
  INSTANCE;

  ...
};

Listeners.register(MyListener.INSTANCE);
```

Examples

```
public class MyListenerProviderFactory implements
ListenerProviderFactory {
  public ListenerProvider
  create(ListenerProvider parent) {

    return ListenerProviders.builder()
    .add(MyListener.class)

    .parent(parent)
    .build();
  }
}
```

Examples

```
public class MyListenerProviderFactory implements
ListenerProviderFactory {
  public ListenerProvider
  create(ListenerProvider parent) {
    Set<Class<? extends Listener>> classes = ...;
    return ListenerProviders.builder()
    .add(MyListener.class)
    .addAll(classes)
    .parent(parent)
    .build();
  }
}
```

Examples

```
public class MyListenerProviderFactory implements
ListenerProviderFactory {
  public ListenerProvider
  create(ListenerProvider parent) {
    Set<Class<? extends Listener>> classes = ...;
    return ListenerProviders.builder()
    .add(MyListener.class)
    .addAll(classes)
    .parent(parent)
    .build();
  }
}
// Plug-in XML - Extensions – Add
// sk.stuba.fiit.perconik.core.services.listeners
// New provider - Set class to
// MyListenerProviderFactory
```

Examples

```
enum MyListener implements TextSelectionListener {
  INSTANCE;
  static Executor executor = newCachedThreadPool();













  ...
};
```

Examples

```
enum MyListener implements TextSelectionListener {
  INSTANCE;
  static Executor executor = newCachedThreadPool();

  public void selectionChanged(IWorkbenchPart part,
  ITextSelection selection) {

    executor.execute(new Runnable() {
      public void run() {
        process(selection);
      }
    });
  }

  ...
};
```

Examples

```
enum MyListener implements TextSelectionListener {
  INSTANCE;
  static Executor executor = newCachedThreadPool();

  public void selectionChanged(IWorkbenchPart part,
  ITextSelection selection) {
    final long time = currentTime();
    executor.execute(new Runnable() {
      public void run() {
        process(time, selection);
      }
    });
  }

  ...
};
```

Source Code

- Open Source under the MIT License
- Organization and repositories at GitHub

Links

http://perconik.github.io

Eclipse Integration Site

http://perconik.github.io/update

Eclipse Update Site

http://github.com/perconik/perconik

Source Code Repository

Summary

- 3 Eclipse Features and Plug-ins
- Several nifty features + Javadocs
- Support for 30 most used Eclipse listeners
- Synchronized with UI, configurable at runtime
- Easy to use, both directly or via plug-in ext.
- Gratex Activity Watcher, Content Tags and Services
- Under the hood (implementation & tricks)
- Open Source under MIT License at GitHub