Kieker Data Bridge and Instrumentation Language

Kieker Workshop

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Motivation

- Kieker
  - Primarily supports Java
  - Special solutions for some languages
- Every new languages have to implement
  - Monitoring records & probes
  - Record translation
  - Record transmission
  - Weaving mechanism

Present Solutions

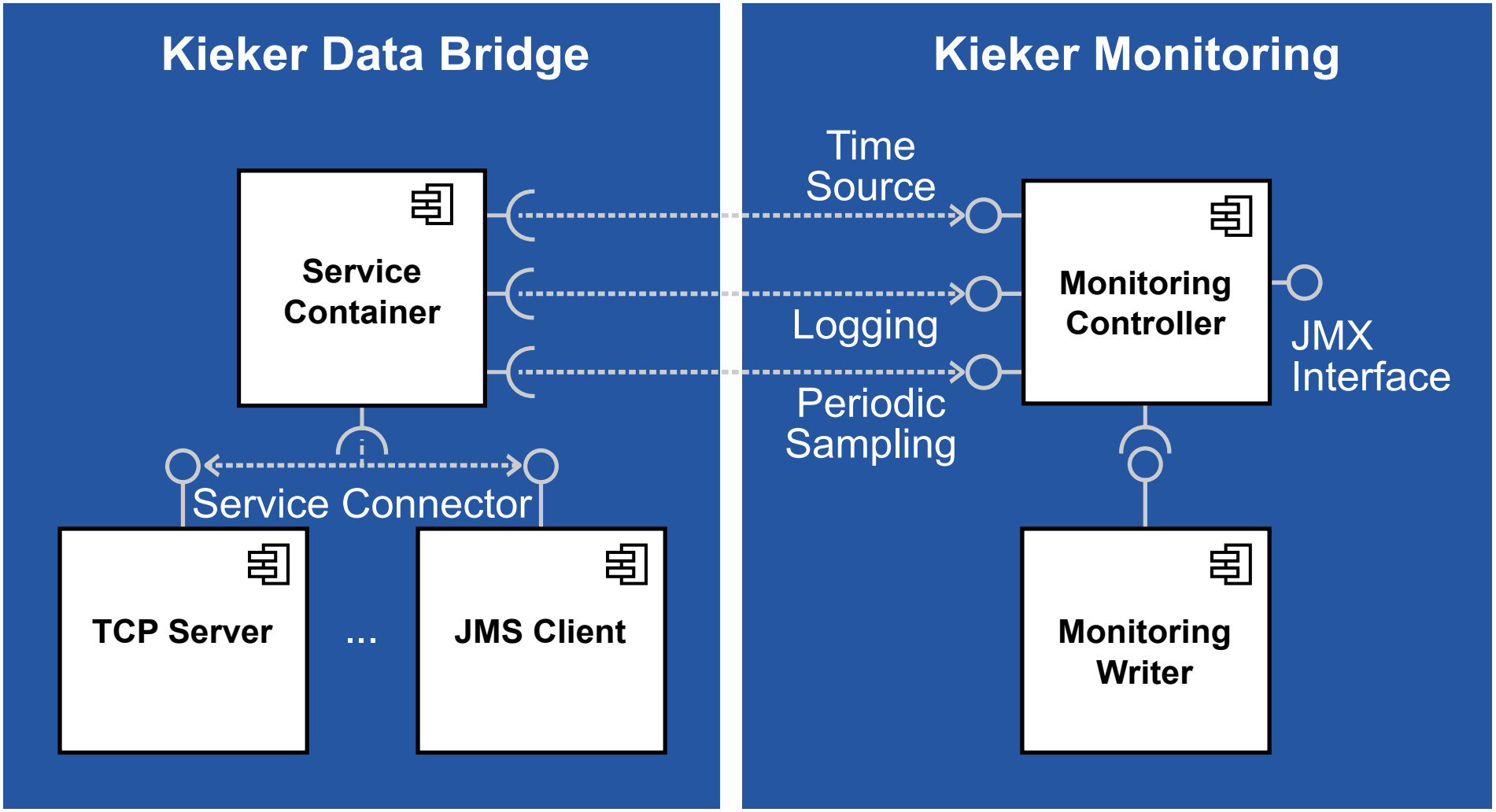
- Kieker.4com VisualBasic 6
- Kieker.4net C#
- Cobol-Dialects

Goal

Goal Establish a standard way to add new languages and platforms

Solution

- Kieker Data Bridge
- Instrumentation (Record) Language
- Weaver Collection


Kieker Data Bridge
Service Container
Service Connector
TCP Server
...
JMS Client
Kieker Monitoring
Time Source
Logging
Periodic Sampling
Monitoring Controller
JMX Interface
Monitoring Writer

Service Connectors

TCP Client Connects to a remote service on startup

TCP Single Server Listens for one client

TCP Multi Server Handles multiple clients

JMS Client Connects to a JMS queue

JMS Embedded Start a JMS service and connects to it

Service Container

Input

- Kieker Configuration
- Service Connector

Main Loop

1. Setup Kieker
2. Setup service connector
3. Get record
4. goto 3 if not terminated
5. Close service connector
6. Shutdown Kieker

Other Features

- Connector respawn
- Progress monitor support
- Load record types at startup
- Embeddable container

Service Implementations

CLI Server

- Command line application
- Read class id mapping from ASCII file
- Can run as deamon

Eclipse Plugin

- Eclipse job & run configuration
- Class mapping setup in run configuration

Serialization Format

General Structure

- First value **type id** (int32)
- Other values in order of declaration

Kieker	fields expressed in TYPES
Other	reflection API (non static fields)

References

- Id only
  - First byte = 0
  - Second value **type id** (int32)
  - Unique object run-time id
- Containment
  - First byte = 1
  - Second value **type id** (int32)
  - Other values in order of declaration (Java only)

Serialization Format

Binary Format

- Based on **Java base-types**
- Byte order **big endien** (network byte order)
- String composed of

length	32bit signed integer (int)
data	variable length byte vector

Text Format

- Semicolon separated value list

Service Connector API

```
public interface IServiceConnector {

/** setup connector */
void setup() throws Exception;

/** close connector */
void close() throws Exception;

/** get next record */
IMonitoringRecord deserialize() throws Exception;
}
```

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- Language independent record notation
- Annotate nodes of arbitrary models/ASTs

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Requirements

- Source language meta model independent
- Define probes for meta-model classes (nodes)
- Define annotations (like AspectJ)

Generation of

- Type compatible record types across languages
- Serialization functions

Supports

- Java (example generator, run-time environment present)
- C (example probe code)
- Perl (example probe code)

```
package kieker.common

record OperationExecutionRecord {
    default string NO_SESSION_ID = "<no-session-id>"
    default long NO_TRACEID = -1
    default long NO_HOSTNAME = "<default-host>"
    default long NO_TIMESTAMP = -1
    default int NO_EOI_ESS = -1

    string operationSignature
    string sessionId = NO_SESSION_ID
    long traceId = NO_TRACEID
    long tin
    long tout
    string hostname = NO_HOSTNAME
    int eoi = NO_EOI_ESS
    int ess = NO_EOI_ESS
}
```

Language Independent Probe Notation

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```
package kieker.common

model java "http://www.eclipse.org/JvmTypes"

import kieker.common.OperationExecutionRecord

probe OperationExecutionProbe : java::MethodDeclaration {
    use OperationExecutionRecord
}
```

Weaver Technologies

- AspectJ
- Perl-Weaver (Nis)
- AspectC or other C weaver

Question Do we need a generic weaving language?

Summary

- Kieker Data Bridge
  - Multi protocol support
  - Serialization method
  - Extendable record library
  - Two use cases in Perl and C
- Instrumentation Language
  - Platform independent record notation
  - Generator for Java (experimental)

To Do List

- Kieker Data Bridge
  - Improve documentation
  - Refactor to meet Kieker package naming
  - Integrate into Kieker distribution
  - Support for adaptive monitoring
  - Support for AJAX/HTTP connection
- Instrumentation Language
  - Finalize grammar (checks and type evaluation)
  - Generator for Perl & C
  - Finalize generator for Java
- Kieker
  - C run-time library and instrumentation (thesis)
  - Perl run-rime package