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eNTERFACE

The SIMILAR NoE
Summer Workshop
on Multimodal Interfaces
2005

OpenInterface: SIMILAR platform

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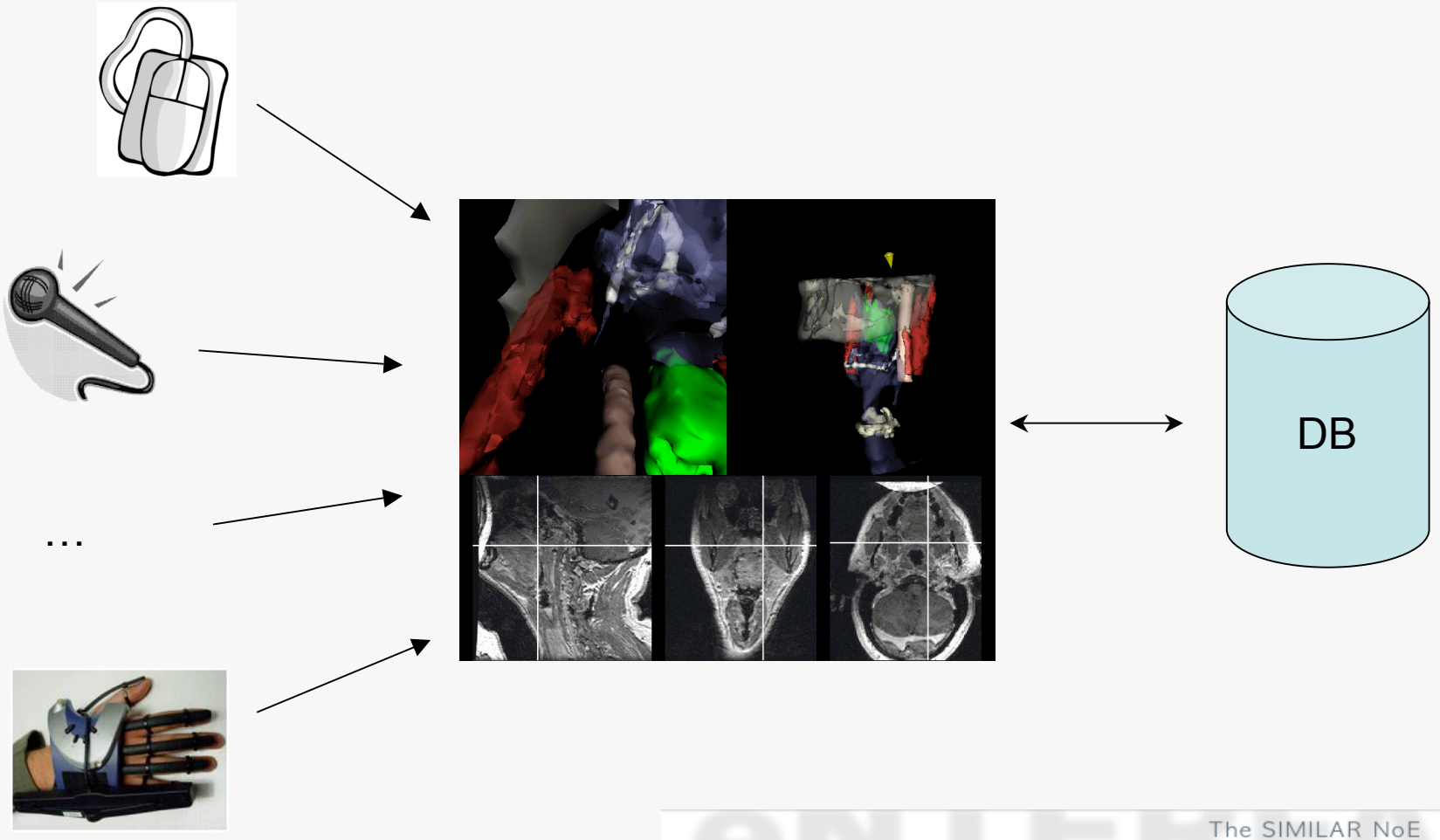
Outline

- What
  - OpenInterface goals
- Why build a new platform
- How
  - Platform requirements
  - Platform design overview
  - Development cycle
  - What OpenInterface is not
- Questions

OpenInterface Goals

- Example: Testing a new user interaction model
  - Available Materials:
    - Several interaction devices and miscellaneous libraries as heterogeneous software code (Matlab, C/C++, Java, Python).
  - Don't want to:
    - Build glue code yourself (might include substantial code modifications)
    - Think of modality fusion or fission mechanism

Testing a new user interaction model



Testing a new user interaction model

- OpenInterface would :
  - Allow seamless integration of heterogeneous soft
    - middleware
  - Allow rapid prototyping of new multimodal application
    - Bundled generic fission and fusion mechanism
    - Easy software connection

Outline

- ✓ What
  - ➢ OpenInterface goals
- • Why build a new platform

Why building a new Platform?

- State-of-the-art
  - Technology to achieve heterogeneous program communication. (CORBA, EJB, various middleware)
  - Multimodal platform. (Galaxy, Kirusa, etc.)
- Why
  - Middleware are heavy-weighted, or technology is platform dependent.
  - Multimodal platforms come with fixed number of modalities.

Outline

- ✓ Why a new platform
- How
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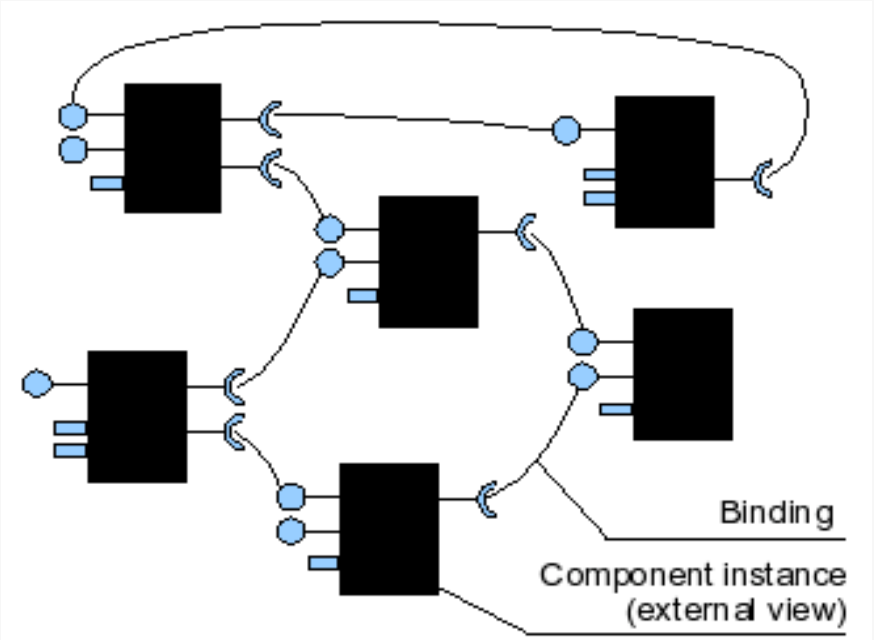
Platform Requirements

- Useful high level programming language support:
  - C/C++, Java, Matlab, Python

•Plug n Play behavior.

•Lightweight skeleton platform.



Platform Requirements

- Example of front-end applications
  - Components database for targeted purpose
    - User Interaction
    - Benchmarking
    - …
  - « Just In Time » platform for heterogeneous software composition.
  - …

How

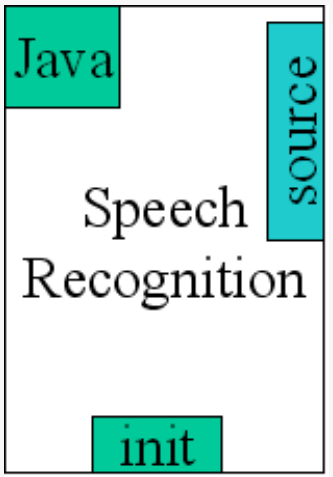
- ✓ Platform requirements
- ➢ Platform design overview
- ➢ Development cycle
- ➢ What OpenInterface is not

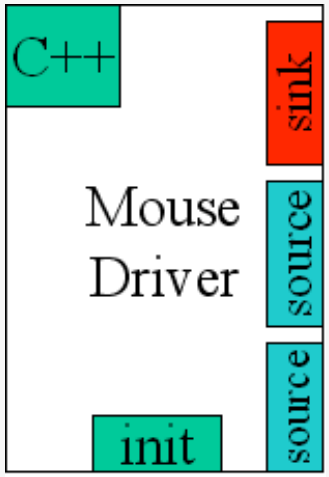
Platform Design Overview

- Component Oriented.
- Easy Heterogeneous components Integration
  - Component Interface Description Language
  - Proxies and Stubs
- Multimodal interaction and multimodal data oriented feature
  - Bundles Fission and Fusion components
- Component Composition
  - Pipeline Description and Configuration Language.

Component Architecture

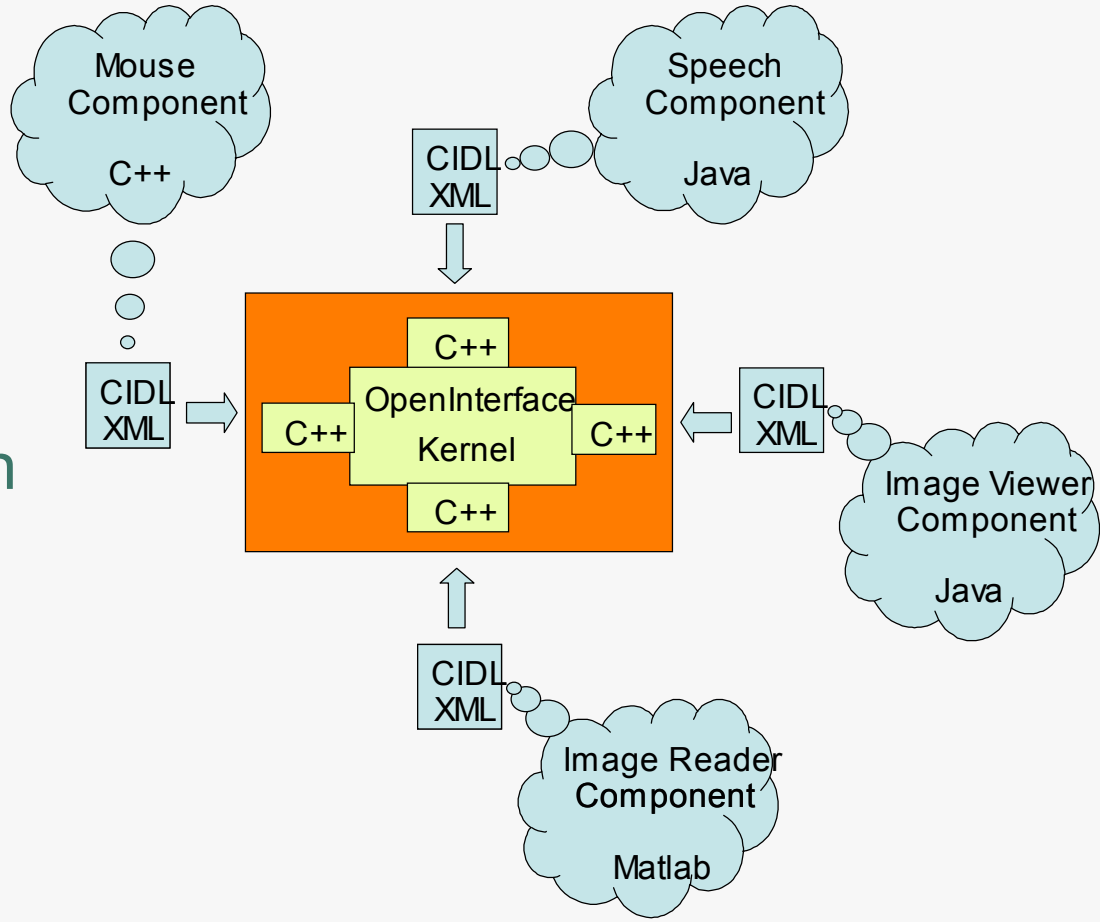
- Step towards reusable software.
- Components behave like objects.
- Software delivered as reusable independent unit with exported/imported I/O interfaces.





Heterogeneous components Integration

- Standard description of interfaces and properties.
- Automatic conversion towards a common language.
- For the kernel, all components are virtually in the same language.

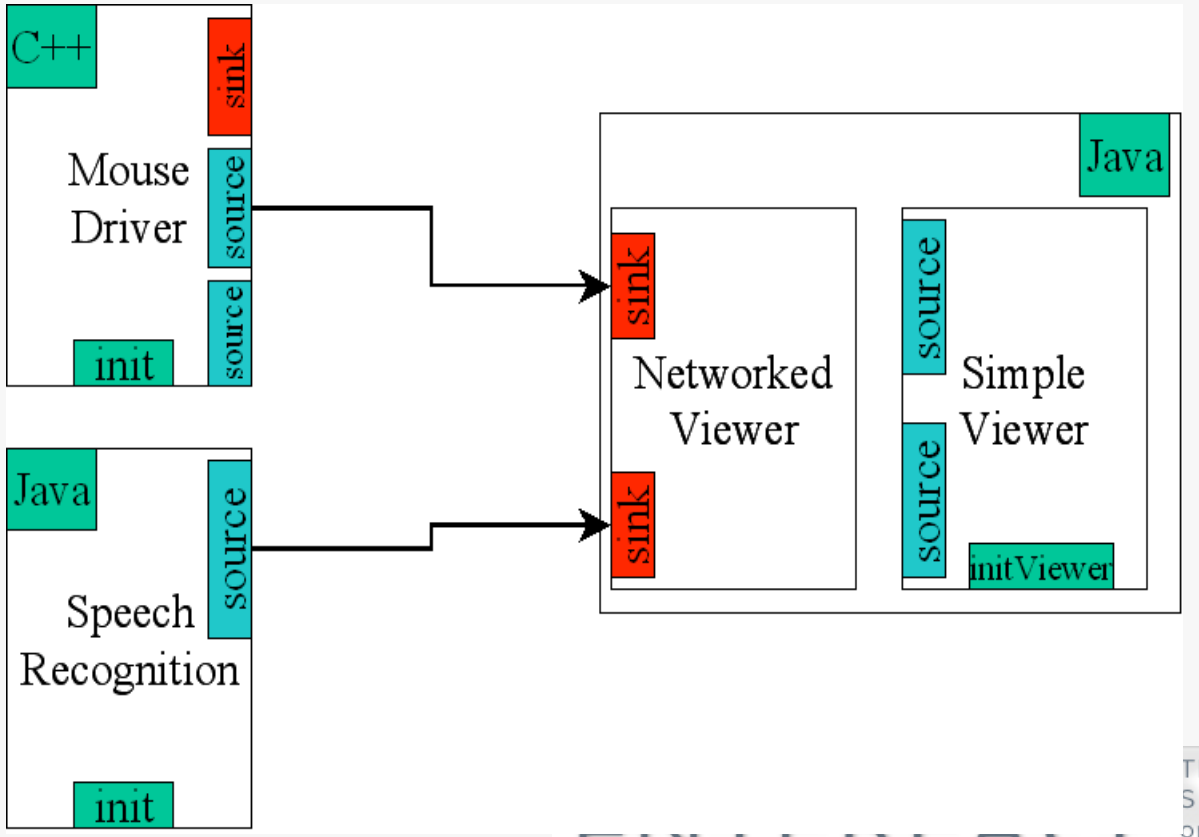


Multimodal aware

- Extended-CIDL to express Fission and Fusion Properties.
- Generic Fission and Fusion mechanism bundled with the kernel.

Component Composition

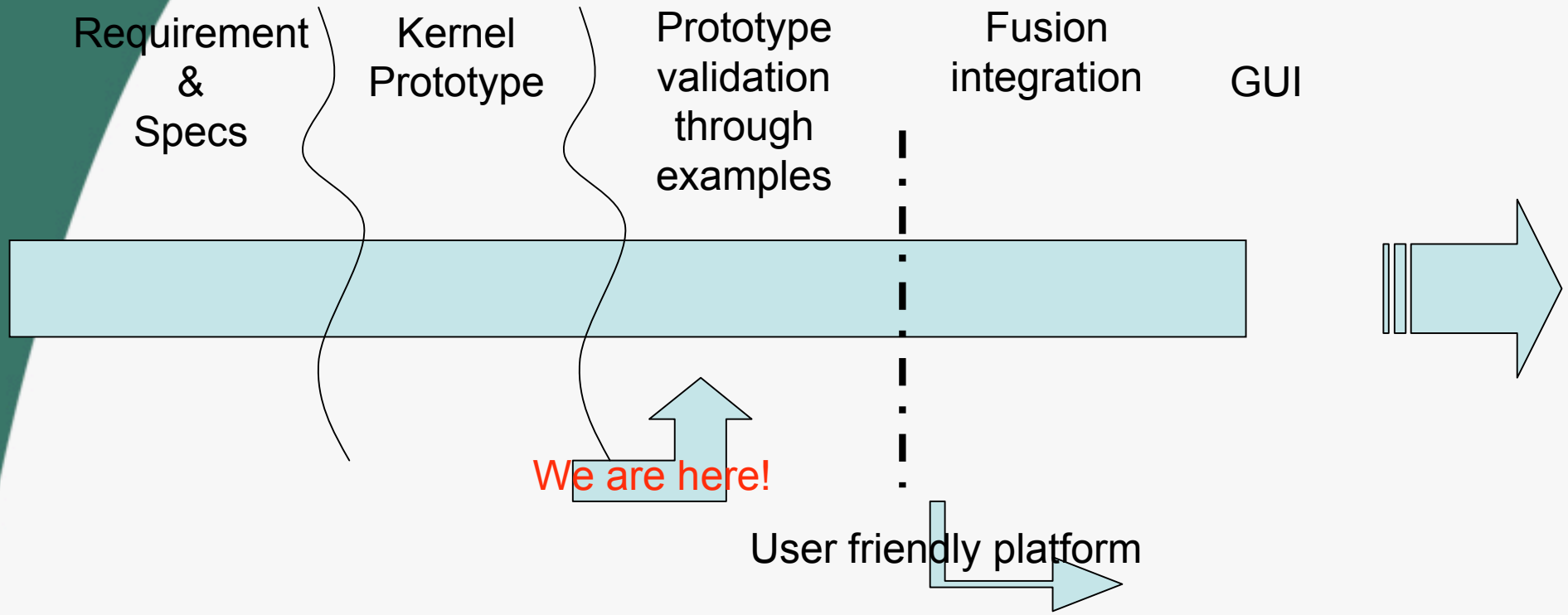
- Pipeline description language to setup a running application.



How

- ✓ Platform requirements
- ✓ Platform design overview
- ➢ Development cycle
- ➢ What OpenInterface is not

Development milestones



- A «rather technical» tutorial is available.

Current Functionalities

- Supported Platform
  - Linux
- Supported Languages (see tutorial for minor restrictions)
  - Java
  - C/C++
  - Matlab (One way communication)
- Description languages
  - CIDL, interfaces description
  - PDCL, pipeline description
- See tutorial for more details. (I'll be around too)

What OpenInterface is not

- Graphical programming language
  - Mainly aims at connecting component
  - Large interaction granularity
  - Design tool
- A repository of miscellaneous programming tools (socket, etc…)
  - Available tools are the ones that have been integrated by the user.

Questions?


Where? How
How? What
What?
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Example CIDL

- scalar]=matlab_foo(b,str)!

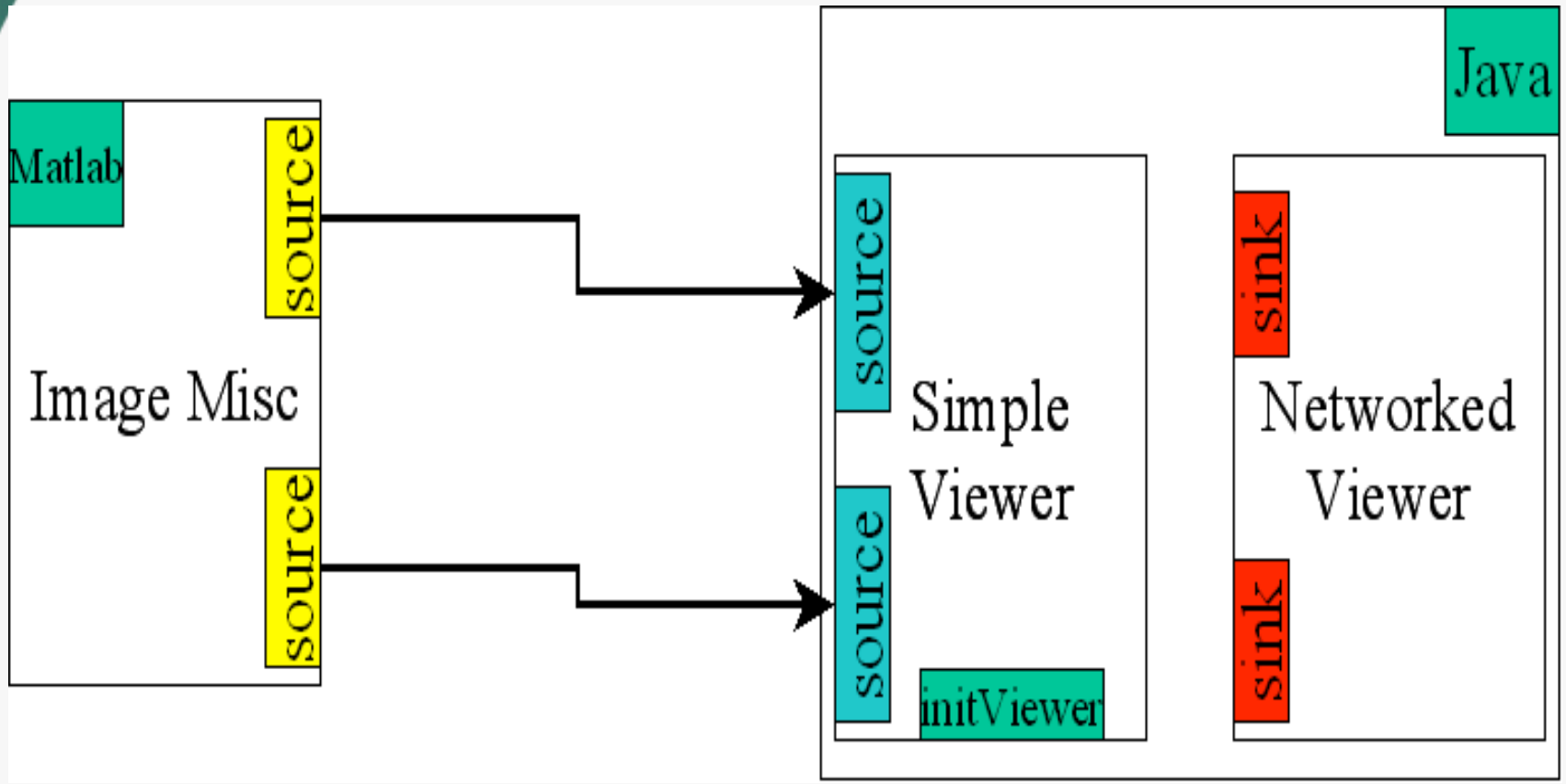
```
<Interface type="function">
        <Name value="matlab_foo"/>
        <Argument>
          <Param name="b">
            <Descr>human readable description for 'b'
here</Descr>
            <PrimitiveType name="int"/>
          </Param>
          <Param name="str">
            <PrimitiveType name="string"/>
          </Param>
        </Argument>
        <Return>
          <Param name="ret">
            <PrimitiveType name="float"/>
          </Param>
        </Return>
 </Interface>
```

Exampe CIDL

- `float** getArray(int * dims)!`

```
<Interface type="function">
            <Name value="getArray"/>
            <Argument>
              <Param name="dims">
                <Descr>array dimensions</Descr>
                <ArrayType>
                  <PrimitiveType name="int"/>
                  <DimSpec type="custom">
                        <NDims value="1"/>
                        <DimList>
                          <NDims value="2"/>
                        </DimList>
                  </DimSpec>
                </ArrayType>
              </Param>
            </Argument>
            <Return>
              <Param name="result">
                <ArrayType>
                  <PrimitiveType name="float"/>
                  <DimSpec type="custom">
                        <NDims value="2"/>
                        <DimList ref="dims"/>
                  </DimSpec>
                </ArrayType>
              </Param>
            </Return>
</Interface>
```

Example Pipeline



Example Pipeline

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE Pipeline SYSTEM
"/home/lawson/work/development/openinterface/prototype2/common/pipeline.dtd">
<Pipeline>
  <FacetList>
    <Facet id="simpleViewer" name="simpleViewer" config="ImageViewer_cfg0.xml"/>
    <Facet id="imgserver" name="imgserver" config="testmatlab_cfg0.xml"/>
    <Facet id="imgdisplay" name="imgdisplay" config="testmatlab_cfg0.xml"/>

  </FacetList>
  <PinList>
    <Pin id="pin7" facet="simpleViewer" name="imageReader"/>
    <Pin id="pin8" facet="imgserver" name="imageserver"/>
    <Pin id="pin9" facet="imgdisplay" name="imagedisplay"/>
    <Pin id="pin10" facet="simpleViewer" name="imageDisplay"/>
    <Pin id="pin11" facet="simpleViewer" name="injectArray"/>
    <Pin id="pin12" facet="ctest" name="testc_fun"/>
  </PinList>
  <Pipe>
  <Plug source="pin7" sink="pin8">
    <Filter>
      <TargetValue target="filename">
        <SourceValue source="imagefile"/>
      </TargetValue>
    </Filter>
    <OutFilter>
      <TargetValue target="pixels">
        <SourceValue source="image"/>
      </TargetValue>
    </OutFilter>
    </Plug>
```

Example Pipeline

```
<Plug source="pin10" sink="pin9">
 <Filter>
   <TargetValue target="imArray">
     <SourceValue source="pixels"/>
   </TargetValue>
 </Filter>
 </Plug>
 <Plug source="pin11" sink="pin12">
 <Filter>
   <TargetValue target="dims">
     <SourceValue source="dims"/>
   </TargetValue>
   <TargetValue target="array">
     <SourceValue source="data"/>
   </TargetValue>
 </Filter>
 </Plug>
</Pipe>
</Pipeline>
```