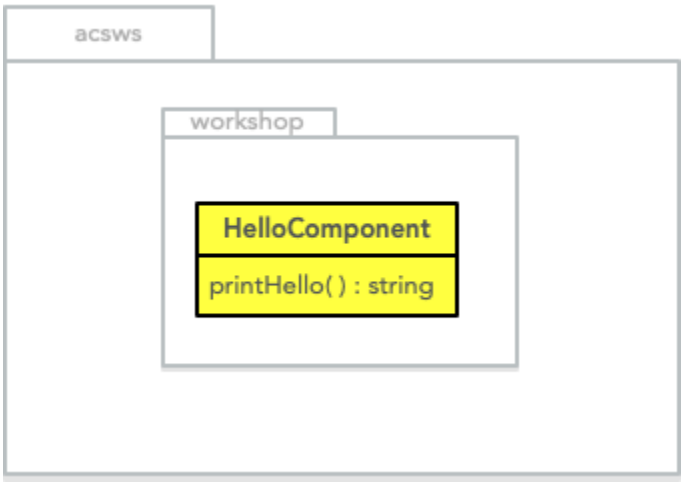
On this day we will focus on preparing the initial implementation of our first component. By the end of the day, we expect the groups to:

- [ ] Go through "HelloComponent" implementation for the assigned programming language
- [ ] Inheritance from IDL interface to be implemented
- [ ] Basic implementation of the methods
- [ ] Modifying CDB configuration in your test directory
- [ ] Exercising your component implementation from objexp and/or a PySimpleClient instance

As a guide, we're going to show you a very simple component implementation.

The UML description for our component is:



First we create the directory for the IDL:

```
getTemplateForDirectory MODROOT_WS idlHelloComp
cd idlHelloComp/src
touch ../idl/HelloComponent.idl
```

We fill the IDL with the following:

idlHelloComp/idl/HelloComponent.idl

```
#ifndef _HELLOCOMPONENT_IDL_
#define _HELLOCOMPONENT_IDL_

#pragma prefix "acsws"

#include <acscomponent.idl>

module workshop {
    interface HelloComponent : ACS::ACSComponent {
        string printHello();
    };
};

#endif
```

We modify the Makefile:

idlHelloComponent/src/Makefile

```
...
IDL_FILES = HelloComponent
HelloComponentStubs_LIBS = acscomponentStubs
...
COMPONENT_HELPERS=on
...
```

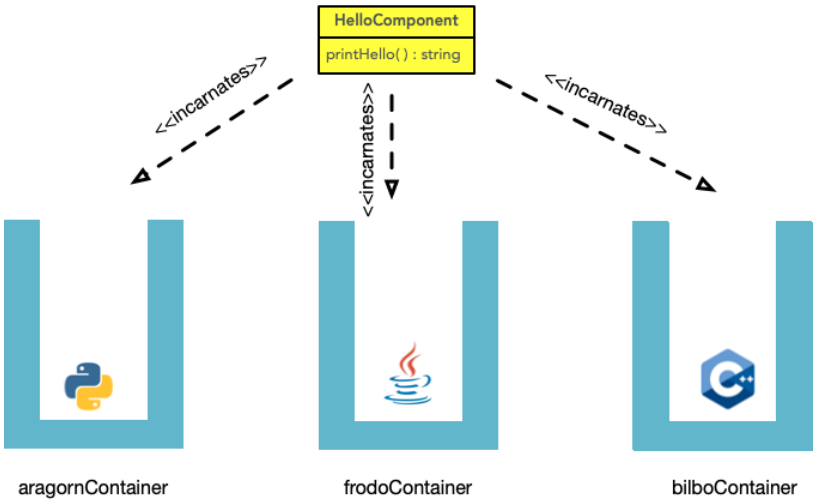
We then compile and install the IDL definitions:

Compilation

```
make -j all install
```

Configuration

The following image depicts the deployment configuration needed:



Add the following configuration in the $ACS_CDB/CDB/MACI/Components/Components.xml:

Components.xml

```
...
  <e Name="CPP_HELLO_COMP"
     Code="HelloComponentImpl"
     Type="IDL:acsws/workshop/HelloComponent:1.0"
     Container="bilboContainer"
     ImplLang="cpp"/>
  <e Name="JAVA_HELLO_COMP"
     Code="acsws.workshop.HelloComponentImpl.HelloComponentComponentHelper"
     Type="IDL:acsws/workshop/HelloComponent:1.0"
     Container="frodoContainer"
     ImplLang="java"/>
  <e Name="PY_HELLO_COMP"
     Code="ws.HelloComponentImpl"
     Type="IDL:acsws/workshop/HelloComponent:1.0"
     Container="aragornContainer"
     ImplLang="py"/>
...
```

The above configuration is assuming that we're going to use the default 3 containers.

Implementation

Python

pyHelloComp

```
getTemplateForDirectory MODROOT_WS pyHelloComp
cd pyHelloComp/src
mkdir ws
touch ws/__init__.py
touch ws/HelloComponentImpl.py
```

We modify the Makefile for this component:

pyHelloComp/src/Makefile

```
...
PY_PACKAGES = ws
...
```

We fill the component code as follows:

pyHelloComp/src/ws/HelloComponentImpl.py

```
# Client stubs and definitions, such as structs, enums, etc.
import workshop
# Skeleton infrastructure for server implementation
import workshop__POA

# Base component implementation
from Acspy.Servants.ACSComponent import ACSComponent
# Services provided by the container to the component
from Acspy.Servants.ContainerServices import ContainerServices
# Basic component lifecycle (initialize, execute, cleanUp and aboutToAbort methods)
from Acspy.Servants.ComponentLifecycle import ComponentLifecycle

class HelloComponentImpl(workshop__POA.HelloComponent, ACSComponent, ContainerServices, ComponentLifecycle):
    def __init__(self):
        ACSComponent.__init__(self)
        ContainerServices.__init__(self)
        self._logger = self.getLogger()
    def printHello(self):
        print("Just printing 'Hello World!'")
        return "Hello World!"
```

Java

jHelloComp

```
getTemplateForDirectory MODROOT_WS jHelloComp
cd jHelloComp/src
mkdir -p acsws/workshop/HelloComponentImpl
touch acsws/workshop/HelloComponentImpl/HelloComponentImpl.java
cp ../../idlHelloComp/src/acsws/workshop/HelloComponentImpl/HelloComponentComponentHelper.java.tpl acsws
/workshop/HelloComponentImpl/HelloComponentComponentHelper.java
```

We modify the Makefile for this component:

jHelloComp/src/Makefile

```
...
JARFILES = HelloComponentImpl
HelloComponentImpl_DIRS = acsws
...
```

We fill the component code as follows:

jHelloComp/src/acsws/workshop/HelloComponentImpl/HelloComponentImpl.java

```
//Suggested: import alma.<Module>.<Interface>Impl; //But anything, really
package acsws.workshop.HelloComponentImpl;

//Base component implementation, including container services and component lifecycle infrastructure
import alma.acs.component.ComponentImplBase;

//Skeleton interface for server implementation
import acsws.workshop.HelloComponentOperations;


//ClassName usually is <Interface>Impl, but can be anything
public class HelloComponentImpl extends ComponentImplBase implements HelloComponentOperations {
    public HelloComponentImpl() {
    }
    public String printHello() {
        System.out.println("Just printing 'Hello World!'");
        return new String("Hello World!");
    }
}
```

C++

We create the needed directories:

cppHelloComp

```
getTemplateForDirectory MODROOT_WS cppHelloComp
cd cppHelloComp/src
touch HelloComponentImpl.cpp
touch ../include/HelloComponentImpl.h
```

We modify the Makefile for this component:

cppHelloComp/src/Makefile

```
...
INCLUDES = HelloComponentImpl.h
...
LIBRARIES = HelloComponentImpl
HelloComponentImpl_OBJECTS = HelloComponentImpl
HelloComponentImpl_LIBS = HelloComponentStubs acscomponent
...
```

We fill the component code as follows:

cppHelloComp/include/HelloComponentImpl.h

```
#ifndef _HELLO_COMPONENT_IMPL_H
#define _HELLO_COMPONENT_IMPL_H

#ifndef __cplusplus
#error This is a C++ include file and cannot be used from plain C
#endif

//Base component implementation, including container services and component lifecycle infrastructure
#include <acscomponentImpl.h>

//Skeleton interface for server implementation
#include <HelloComponentS.h>

//Error definitions for catching and raising exceptions
class HelloComponentImpl : public virtual acscomponent::ACSComponentImpl, public virtual POA_workshop::
HelloComponent {
  public:
    HelloComponentImpl(const ACE_CString& name, maci::ContainerServices * containerServices);
    virtual ~HelloComponentImpl();
    char* printHello();
};

#endif
```

cppHelloComp/src/HelloComponentImpl.cpp

```
#include <HelloComponentImpl.h>

HelloComponentImpl::HelloComponentImpl(const ACE_CString& name, maci::ContainerServices * containerServices) :
ACSComponentImpl(name, containerServices) {
}

HelloComponentImpl::~HelloComponentImpl() {
}

char* HelloComponentImpl::printHello() {
    std::cout << "Just printing 'Hello World!'" << std::endl;
    return CORBA::string_dup("Hello World!");
}

/* --------------- [ MACI DLL support functions ] -----------------*/
#include <maciACSComponentDefines.h>
MACI_DLL_SUPPORT_FUNCTIONS(HelloComponentImpl)
/* ----------------------------------------------------------------*/
```

With this information we are ready to compile our first component that will print the "Hello World" message.

Client

First launch your acs container with the modified ACS CDB

Start container

```
acsStartContainer -py aragornContainer
acsStartContainer -java frodoContainer
acsStartContainer -cpp bilboContainer
```

For simplicity, we implement a simple client in Python to communicate with the 3 programming languages:

```
from Acspy.Clients.SimpleClient import PySimpleClient

client = PySimpleClient()

hc_py = client.getComponent("PY_HELLO_COMP")
print(hc_py.printHello())

hc_java = client.getComponent("JAVA_HELLO_COMP")
print(hc_java.printHello())

hc_cpp = client.getComponent("CPP_HELLO_COMP")
print(hc_cpp.printHello())
```

Output

The output is seen on each container:

Py

```
...
2020-07-28T21:14:29.850 aragornContainer run - Calling maci::CBComponentInfo::done with descOut.id_tag = 2 for
'PY_HELLO_COMP'
2020-07-28T21:14:29.858 aragornContainer run - Call to maci::CBComponentInfo::done with descOut.id_tag = 2 for
'PY_HELLO_COMP' completed
Just printing 'Hello World!'
...
```

Java

```
...
2020-07-28T21:09:13.385 DELOUSE [frodoContainer] Calling maci::CBComponentInfo::done with descOut.id_tag = %d.1
for 'JAVA_HELLO_COMP'
2020-07-28T21:09:13.411 DELOUSE [frodoContainer] Call to maci::CBComponentInfo::done with descOut.id_tag = %d.1
for 'JAVA_HELLO_COMP' completed
2020-07-28T21:09:16.598 DELOUSE [frodoContainer] intercepted a call to 'JAVA_HELLO_COMP#printHello'.
Just printing 'Hello World!'
2020-07-28T21:09:16.599 DELOUSE [frodoContainer] returning from JAVA_HELLO_COMP#printHello after 0 ms.
...
```

C++

```
...
2020-07-28T21:19:53.080 [Container-ActivationMethod - maci::ActivationMethod::call] Calling maci::
CBComponentInfo::done with descOut.id_tag = 4.
2020-07-28T21:19:53.082 [Container-ActivationMethod - maci::ActivationMethod::call] Call to maci::
CBComponentInfo::done with descOut.id_tag = 4 completed.
Just saying 'Hello World!'
...
```

PySimpleClient

```
...
Hello World!
Hello World!
Hello World!
...
```