Joint Program Executive Office
Joint Tactical Radio System

CORBA Neutral Representation




24-25 August 2010
JTRS SCA Working Group

JPEO JTRS

Task Overview

- **Objective**
  - Transform SCA to a platform independent representation
    - Removes the current specification of CORBA, DTD technologies as the only path for SCA compliance
- **Benefits**
  - Expands SCA applicability to additional form factors and architectures
  - Facilitates new technology incorporation within SCA compliant products
  - Increases ability of SCA products to align with platform specific requirements
- **Impact**
  - Does not disallow / discourage SCA v2.2.2. technology mapping as a valid or legitimate alternative, but requires definition of additional mappings on an as needed basis
  - Requires creation of new test tools with expansion of technology base
  - Necessitates changes in SCA specification

Solution Space

- **Develop an approach to create a platform neutral SCA**
  - Final output will be revised document
- **Provide a set of mapping rules that create an additional technology specific SCA representation**
- **Prioritization is to define a technology independent:**
  - Core Framework
  - Descriptors
  - Underlying RTOS
- **This task is not intended to optimize the SCA model**

Solution

- ***How to Make SCA CORBA Neutral***
  1. Remove CORBA specific wording
  2. Modify SCA interface model representation (UML) to one that can be mapped to several target technologies
  3. Modify / remove any remaining (non-interface) model views to eliminate CORBA
  4. Define mapping rules to create existing SCA equivalent
  5. Define mapping rules to product a second technology target

Remove CORBA specific wording

- **Execute text search, the context of how CORBA or CORBA concepts are used will dictate the subsequent action.**
  - If the current wording is superfluous then the technology specific words can be removed.
  - When technology is integrated with the objective of the underlying text then the sentence will need to be reworded
    - OMG PIM and PSM spec will be a valuable reference

- **Finalization Activities**
  - Reflect changes in document

Modify interface model representation

- **Represent SCA in Unified Modeling Language (UML)**
  - UML is language agnostic and has a standardized visual representation
  - MetaObject Facility (MOF) and UML extension mechanisms provide the ability to design and realize mappings from UML to almost any target
  - A UML -> X mapping is not burdened by any underlying technology assumptions
  - May be leveraged by tools to provide code generation or be linked with other system engineering tools.

- **Finalization Activities**
  - Develop model artifacts
  - Reflect changes in document
  - Maintain model as part of the spec (XML Metadata Interchange – XMI?)

Modify interface model representation

	CORBA Representation	UML Representation	notes
MODEL	CORBA::Interface	Interface	
ELEMENTS	CORBA::Exception	Exception	
	CORBA::Object	Object	A formal representation of a data type that is a reference to an object instance.
	CORBA::Primitive	Primitive (integer, Boolean, string, unlimited natural), others are constructed by layering formatting or constraints on top of primitives	Short, long, long long, double, long double, unsigned short, unsigned long, unsigned long long, boolean, string, char, wchar, wstring, float, typecode, native
	CORBA::Struct	Struct	
	CORBA::Sequence	Sequence	
	CORBA::Any	Any	A formal representation of a data type represents a type that can represent any type. An any logically contains a TypeCode and a value that is described by the TypeCode.
	CORBA::Typedef	Type	
	CORBA::Module	Package	
	void		An operation with no return value
	enum	enumeration	
	octet	A constrained integer data type	An 8-bit quantity that is guaranteed not to undergo any conversion when transmitted by the communication system

Modify (non-interface) Model Views

- **Leverage UML constructs**

- **Finalization Activities**
  - Develop model artifacts
  - Reflect changes in document
  - Maintain model as part of the spec (XMI?)

Modify Remaining Model Views

	SCA 2.2.2 Representation	SCA Mapping Representation
MODEL	Application Behavior Collaboration Diagram	Transform CORBAInterface stereotypes, Evaluate whether or not it makes sense to update diagram to a UML 2 style Communication Diagram
ELEMENTS	Application Factory Behavior Collaboration Diagram	Transform CORBAInterface stereotypes, Evaluate whether or not it makes sense to update diagram to a UML 2 style Communication Diagram
	Registerdevicemanager sequence diagram	Transform CORBAInterface stereotypes, evaluate whether or not it makes sense to update diagram to a UML 2 style Sequence Diagram
	Registerdevice sequence diagram	Transform CORBAInterface stereotypes, evaluate whether or not it makes sense to update diagram to a UML 2 style Sequence Diagram
	Registerservice sequence diagram	Transform CORBAInterface stereotypes, evaluate whether or not it makes sense to update diagram to a UML 2 style Sequence Diagram
	DeviceManager startup sequence diagram	Transform CORBAInterface stereotypes, evaluate whether or not it makes sense to update diagram to a UML 2 style Sequence Diagram
	Adminstate state diagram	Evaluate whether or not it makes sense to update diagram to a UML 2 style State Diagram
	Allocate and deallocate state diagram	Evaluate whether or not it makes sense to update diagram to a UML 2 style State Diagram
	Release Aggregated device sequence diagram	Transform CORBAInterface stereotypes, evaluate whether or not it makes sense to update diagram to a UML 2 style Sequence Diagram
	Release Composite device sequence diagram	Transform CORBAInterface stereotypes, evaluate whether or not it makes sense to update diagram to a UML 2 style Sequence Diagram
	Release Composite and Aggregated device sequence diagram	Transform CORBAInterface stereotypes, evaluate whether or not it makes sense to update diagram to a UML 2 style Sequence Diagram

Define UML to PSM mapping rules

- **UML to PSM mapping**
  - Intent is for SCA Next to be a catalyst
  - Future mappings defined on an as needed basis by community and then introduced as standardization candidate

- **Finalization Activities**
  - Reflect mapping changes in an appendix
  - Introduce any technology specific changes within appendix (e.g. CORBA/e)
  - Revise any main body text as needed to refer to the appendix
  - Provide PSM artifacts such as IDL or header files as part of appendix

UML to PSM mapping

	UML Representation	CORBA Representation	C++ Representation
MODEL	Interface	Interface	Class, which within the framework will inherit the Object representation
ELEMENTS	Exception	Exception	Exception mechanism with exceptions mapped to classes that derive from std exception
	Object	Object	An abstract class whose standard operations are constructors, copy constructors, destructors, and assignment operators
	Primitive (integer, Boolean, string, unlimited natural), others are constructed by layering formatting or constraints on top of primitives	Corresponding Primitive	Corresponding Primitive
	Struct	Struct	struct
	Sequence	Sequence definition	Pointer list of corresponding type
	Any	Any datatype	Approach modeled on boost library any definition
	Type	Typedef	typedef
	Package	Module	namespace
	No return value from an operation	void	void
	enumeration	enum	enum
	A constrained integer data type that corresponds to an Octet	octet	Unsigned char
	attribute	attribute	Member variable