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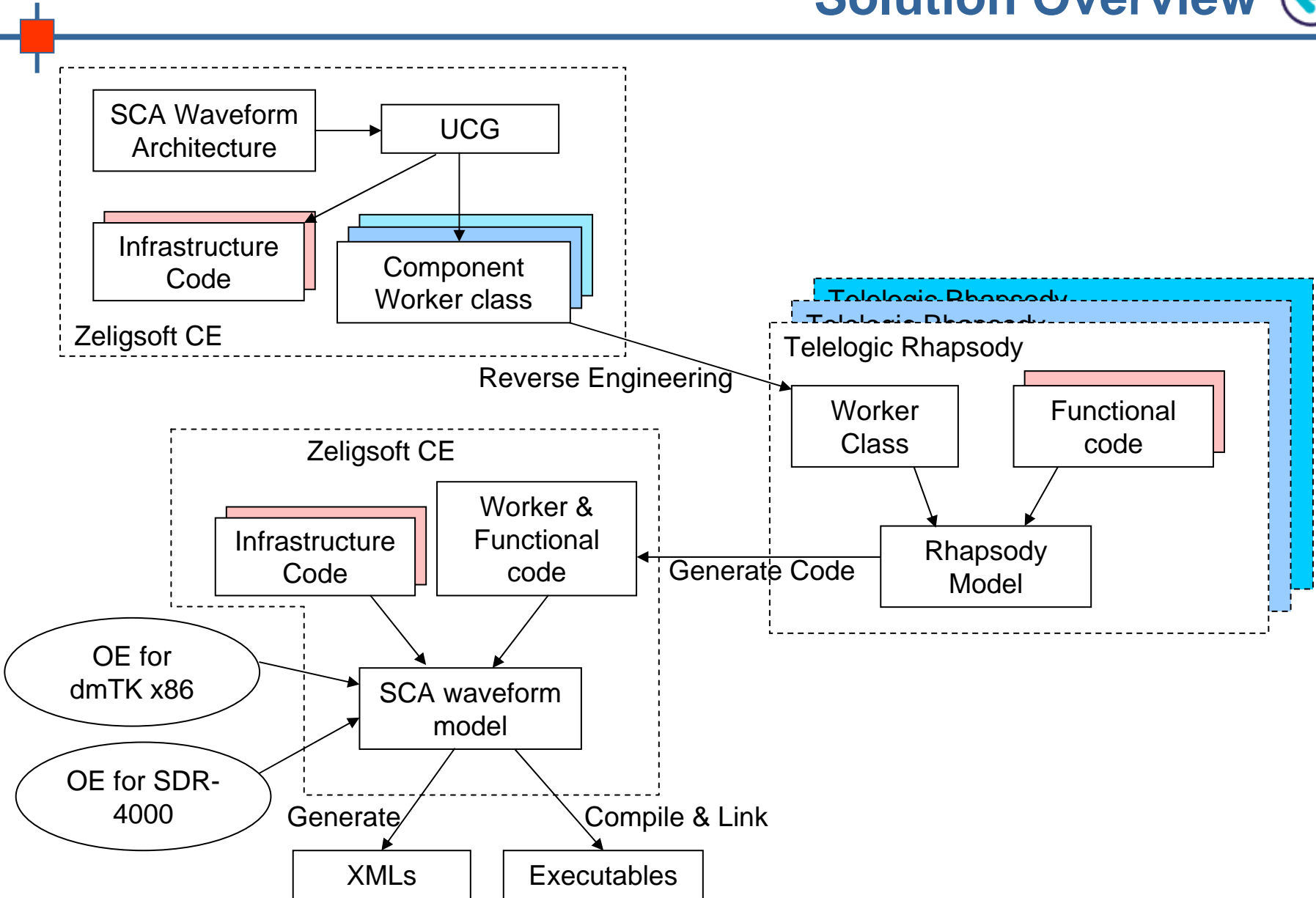


Experience Report: Rapid Model-Driven Waveform Development with UML

Presented by: **Shaw-Ping Lee**

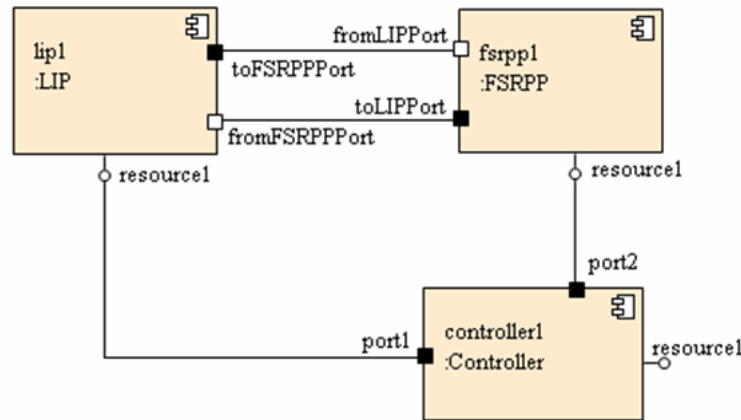
- Introduction
- Waveform Development
- Results
- Future Improvements
- SDR-4000 point-to-point video demonstration (~30 seconds)

- An R & D project – design and develop SCA WNW waveform for Software Defined Radio.
- Target hardware is not available at the beginning – early development on host PC.
- Solution must consider portability (to target) and reusability.
- Not aware of existing solution at the time.
- Need a well defined development process for future projects use.





- Define architecture of the waveform in Zeligsoft CE.
- Components have Uses and Provides ports.
- Component definition translates to OE independent worker code and infrastructure code.

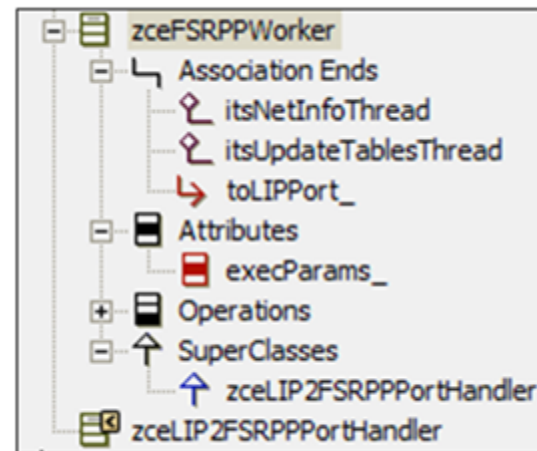




- Worker source code is reversed-engineered into a class in Rhapsody.
- Uses ports shows up as private association.
- Provides Ports shows up as virtual function to be implemented.
- Some infrastructure behaviors terminate in the worker.

```
zceFSRPPWorker
execParams_:FSRPP_params

zceFSRPPWorker(execParams:const ...
~zceFSRPPWorker()
init(execParams:params:const FSRPP...
config_ShortTimeout(shorttimeout:con...
config_EnableMPR(enablempr:const C...
query_ShortTimeout(shorttimeout:CO...
query_EnableMPR(enablempr:CORBA:...
CF_LifeCycle_initialize(portIdentifier:in...
CF_LifeCycle_releaseObject(portIdent...
CF_Resource_start(portIdentifier:in):...
CF_Resource_stop(portIdentifier:int):v...
LIP2FSRPP_OneWayPush(portIdentifiL...
LIP2FSRPP_SyncPush(portIdentifier:i...
settoLIPPort(toLIPPort:zceFSRPP2LIP...
```



- Rhapsody model generate source code.
- Makefiles are different for each target.



- Waveform is built incrementally. Many iterations of modifications.
- Modifications need to propagate from waveform model to Rhapsody model.
 - Only modifications to interfaces, properties, and ports on a component need to propagate.
 - Manually vs. reverse-engineer.



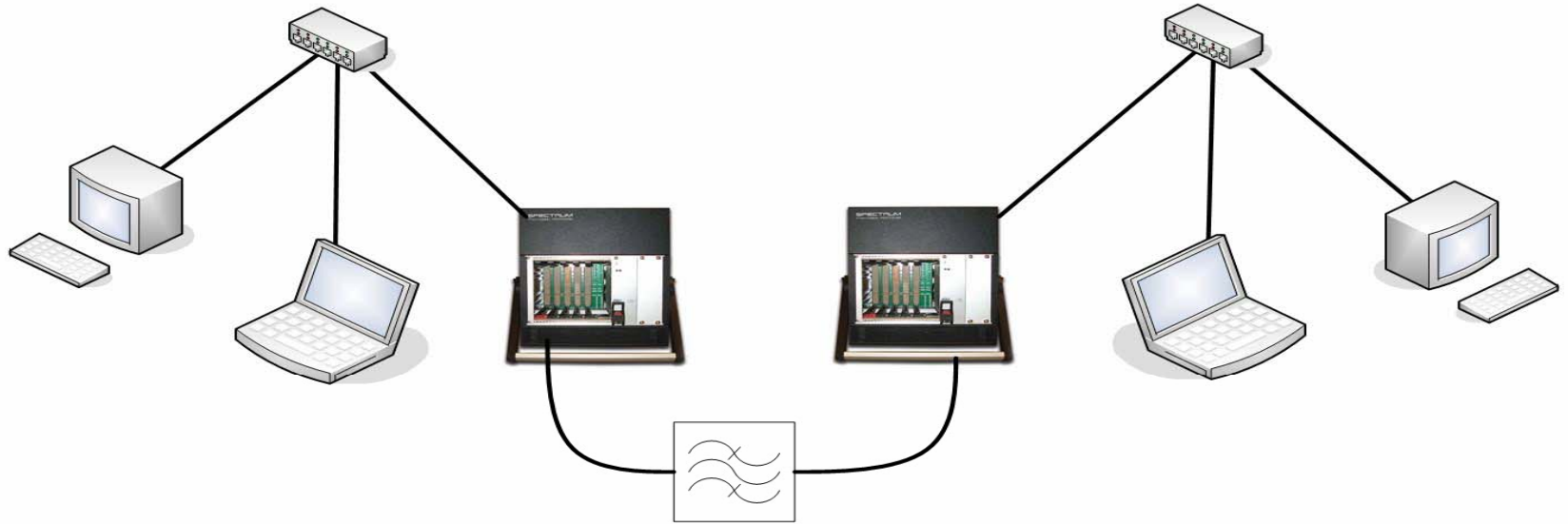
- Infrastructure code and functional code.
- 2 ORBs – ACE TAO and ORBexpress.
 - ORB functions are encapsulated in infrastructure code.
 - Makefiles cleverly make the switch between ORB.
- 2 execution environments.
- QualNet multi-hop test-bed to emulate PHY and verify host PC implementation.
 - Next, waveform is ported to target.
 - Less than 3 weeks of porting.

- Time Saving – Porting time is reduced.
- No requirement for in-house CORBA and SCA experts – shorter learning curve.
- Extra abstraction codes to make clean separation between infrastructure and functional code – but the overhead is small.
- UML improves code quality and code readability.



- Look into the possibility to extend the process to DSP and FPGA in future project.
- Automated integration between Zeligsoft and Rhaspody.

SDR-4000 Point-to-point Video Demonstration





Thank you!

Questions?

