

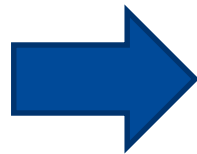
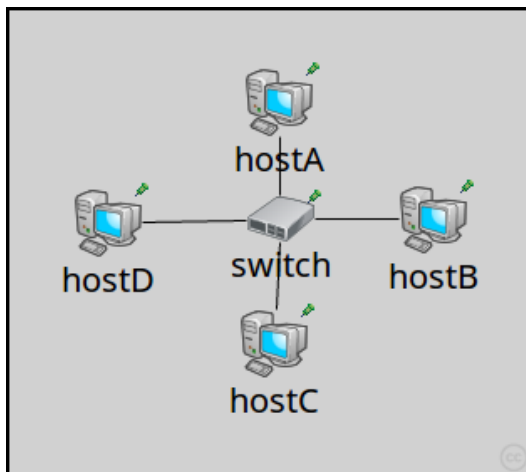
Java Extensions for OMNeT++ 5.0

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Motivation

- **Network simulators: evaluation of innovative applications/protocols**
- **Java:**
 - Very predictable + easy to debug
 - Relatively platform independent (heterogeneous IoT scenarios)
- **Combination of both in two steps:**
 1. Java simulation models for early evaluation
 2. Derive Java prototype implementation to evaluate the approach on different platforms



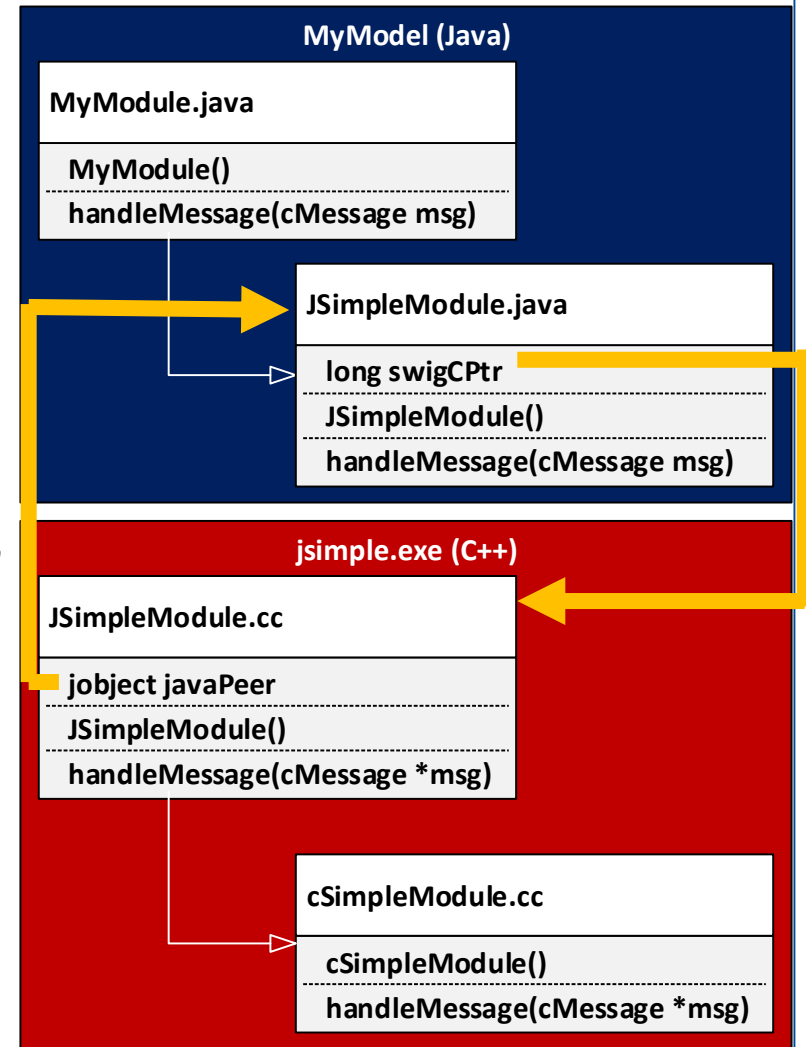
State of the Art – Java Network Simulators

Name	Existing Modules for Reuse	Simulation Models in Java	Still under Maintenance
NS-3	✓	✗	✓
JNS (NS-2 in JAVA)	✓	✓	✗
JNetworkSim	✓	✓	✗
JProwler	✓	✓	✗
Java Simulator	✓	✓	✗
Psimulator2 (for education)	✗	✓	✓

No existing simulator supports Java network simulation sufficiently

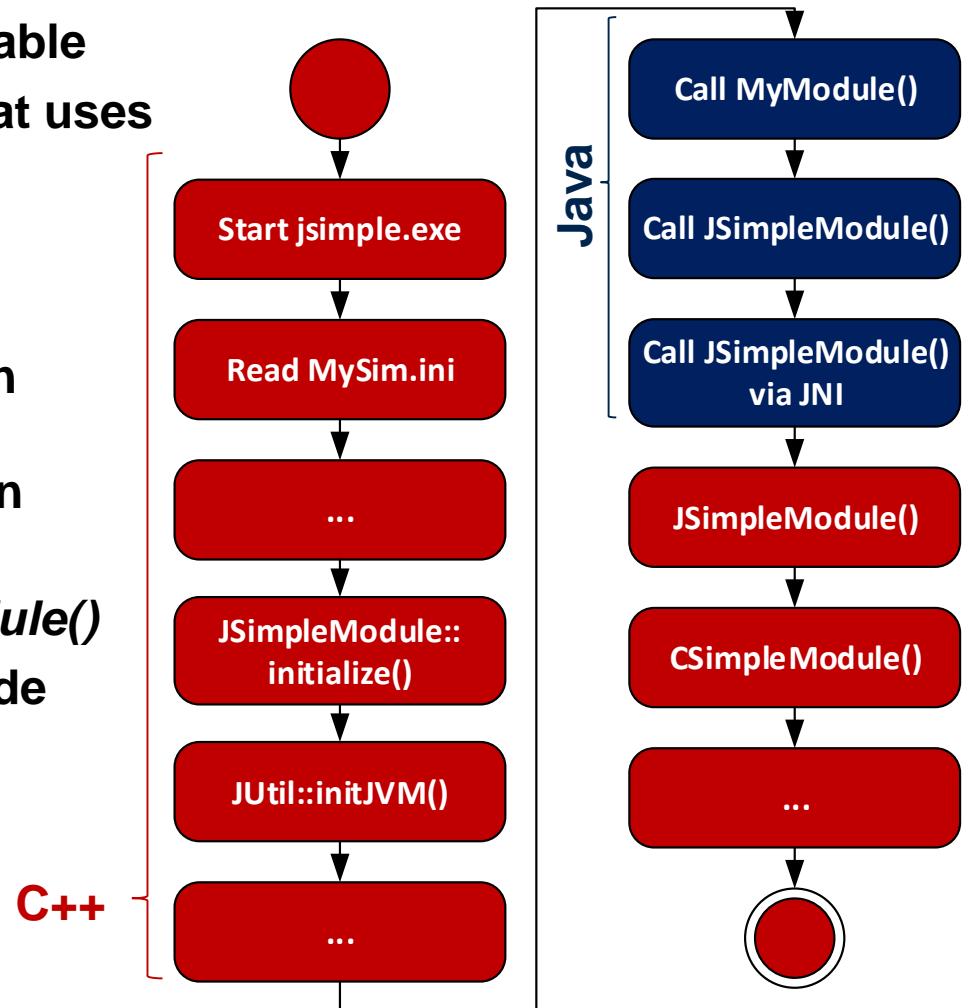
Concept – Class Diagrams (Similar to OMNeT 4.6)

- Base on Java Native Interface (JNI)
- *MyModel*: Java simulation model
- *jsimple.exe*:
 - OMNeT++ simulation kernel
 - Extension modules (*.cc)
- *JSimpleModule.cc*:
 - Inherits from *cSimpleModule.cc*
 - *javaPeer*: pointer to *SimpleModule.java*
- *JSimpleModule.java*:
 - Java wrapper for *JSimpleModule.cc*
 - *swigCPtr*: pointer to *JSimpleModule.cc*



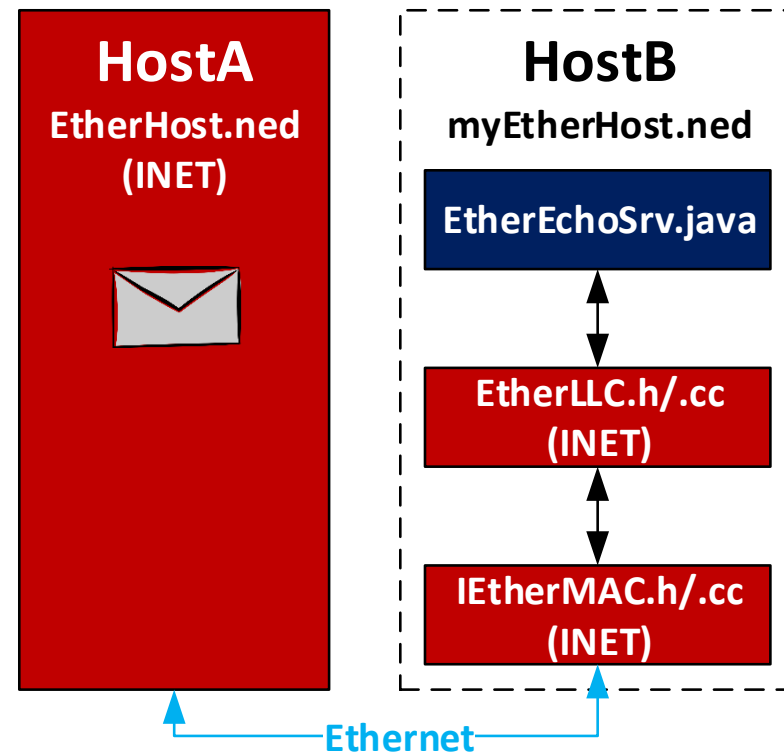
Concept – Execution Order (similar to OMNeT 4.6)

- *jsimple.exe*: simulation executable
- *MySim.ini*: loads a *.ned file that uses *MyModule*
- *initialize()*: calls *initJVM()*
- *initJVM()*: starts JVM
- JVM is a shared library that can execute *.class files
→ Execution of Java simulation models is possible
- *MyModule()*: calls *JSimpleModule()*
- *JSimpleModule()*: calls C++ code



Evaluation – Combination of INET and Java

- Important for reuse of existing modules from INET
- Never demonstrated before OMNeT++ 5.0
- *EtherHost*: example Ethernet host
- *myEtherHost*: own Ethernet host
- *EtherLLC*: Link Layer
- *IEtherMAC*: Mac Layer
- *EtherEchoSrv*:
 - Registers at *EtherLLC*
 - Echoes received Ethernet packets
 - Modifies Ethernet packets (switches SRC and DEST)



Combination of INET and Java is possible

Conclusion and Outlook

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Java Simulator	✓	✓	✗
Psimulator2 (for education)	✗	✓	✓
Java + OMNeT 5.0	✓	✓	✓

- **Outlook: Java extensions for OMNeT++ 5.1 (minor effort)**

**Thank you for your attention.
Questions?**