



# **Concurrency and Applications Working Group Report**

# Outline



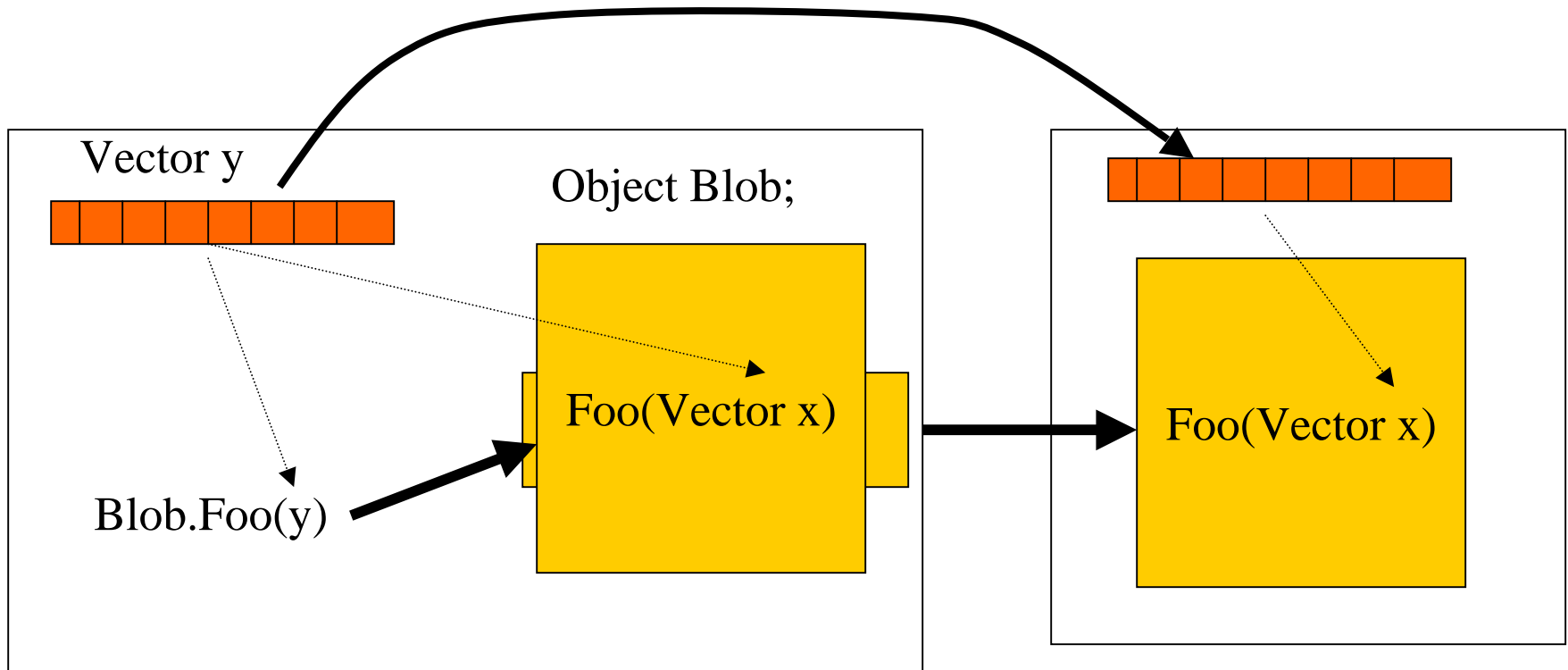
- Critical JDK Issues
  - Remote Method Invocation
- Benchmarks
- Seamless Computing
- The Future

*Much thanks to George Thiruvathukal for the report,  
and Siamak Hassanzadeh for constant support!*

**Java Grande**

# Critical JDK Issues: Serialization and RMI

- What is it and why do we care?



# So what's the problem?



- Serialization is powerful and complex
  - linked heterogeneous data structures
  - current implementations too slow!!!
    - Too much type information explicit on the wire
    - floats and doubles are not handled very efficiently
    - Reflection uses too many copies
- RMI Issues
  - Resources Consumption
    - Too many threads, inefficient use of ports

# What do we need?



- Support for Custom Transport
  - we need implementations that go beyond the TCP/IP socket model.
- Customizable Serialization
  - Large scale scientific apps use lots of arrays of simple types.
  - Move lots of floats and doubles.

# Benchmarks



## ■ Low Level Operations

- array ops, exceptions, mem/GC, casting, object creation/instantiation, threads/sync, IO scalability, RMI

## ■ Kernels

- FFT, Numerical Integration, SOR, LU, Sparse Matrix, Video/Audio, Search, Sort

# Benchmarks



- Large Scale Parallel Application
  - Parallel Geophysics (Karlsruhe)
  - Monte Carlo Simulation (EPCC)
  - Discrete Event Simulation (INRIA/EPCC)
  - Gravitational N-Body (Indiana)
  - Computational Fluid Dynamics (Syracuse)

# Seamless Computing



- Desktop Access to Remote Resources (DAToRR)
  - to design a Java API to the services that would enable users to submit “job” to remote computing Grids using a seamless, standard interface
    - like Java relational database interface standard
- Initial Working Group meeting at Argonne.
- BOF at this meeting



# The Future



## ■ Message Passing Interface

### ■ A standard Java binding for MPI.

- | Several candidate proposals exist.

- | A Draft Spec exists.

- | Actions

- 100% pure implementation to be made available

- Test suite & benchmarks

### ■ An Advanced Java MPI

- | Learn from the MPI/RT efforts

- | Create a truly Object Oriented extension

*Java Grande*

# The Future



## ■ The Impact of Jini

- A collection of standard Java services with major implications for Metacomputing.
  - | Discovery of resources
  - | Distributed Event management
  - | Brokering and Transaction
  - | Java Spaces
- What is the role of Jini in large scale “Grid” environments?