High Performance Computing Research

Sensing Web

Web

Sensing Web

(Artifactual information)

(sensory information)
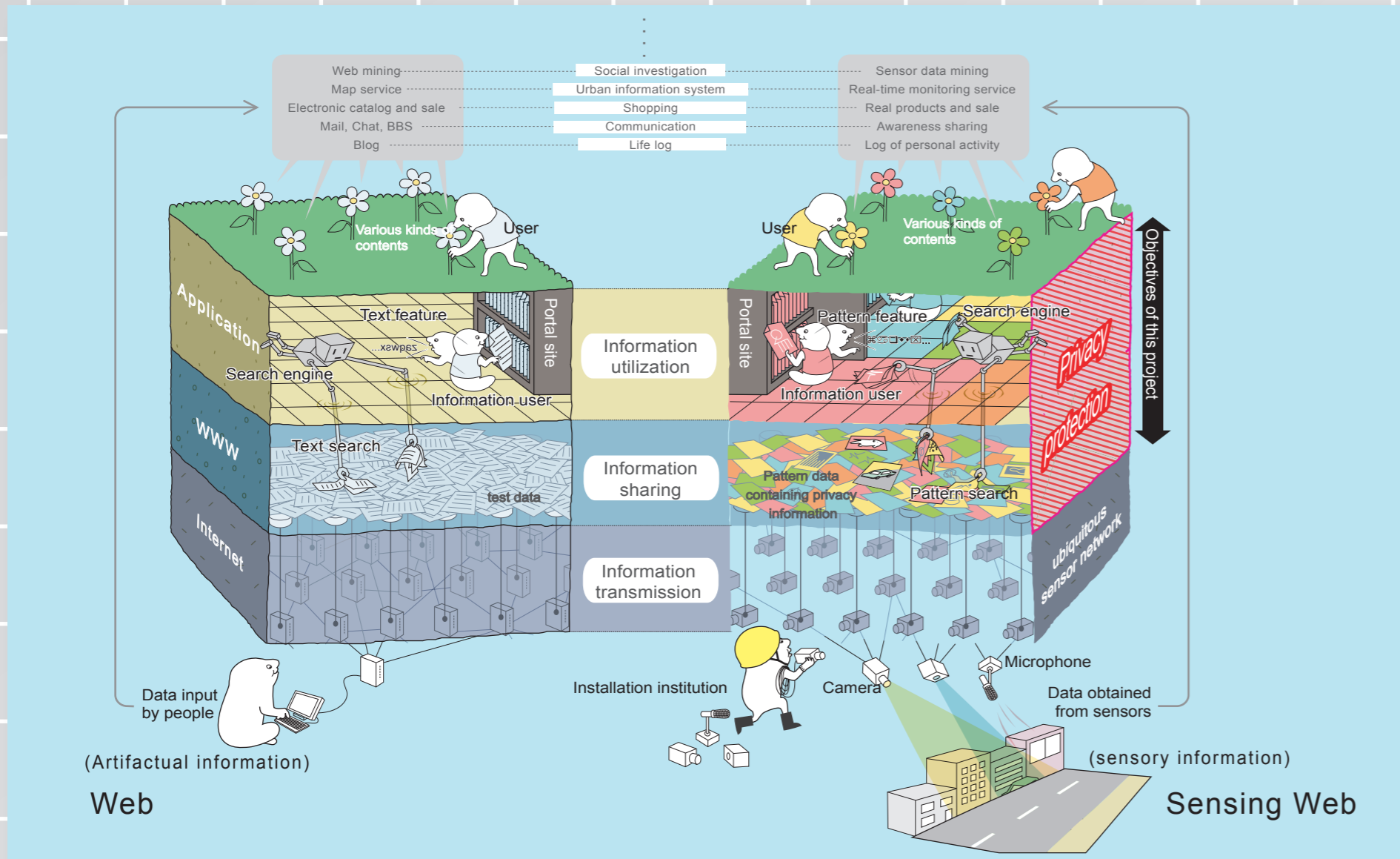
- Aim of Sensing Web is to open the data obtained by the sensors existing in our daily living environment to the public
- The data obtained by observing the real-world directly with sensors include real-world information different from the Web
- Our proposed architecture enables to protect privacy and to filter data at a remote sensor by shipping a remote execution program, which will be executed in a sand box of a remote machine attached to the sensor to keep an access control

Resource Namespace Service
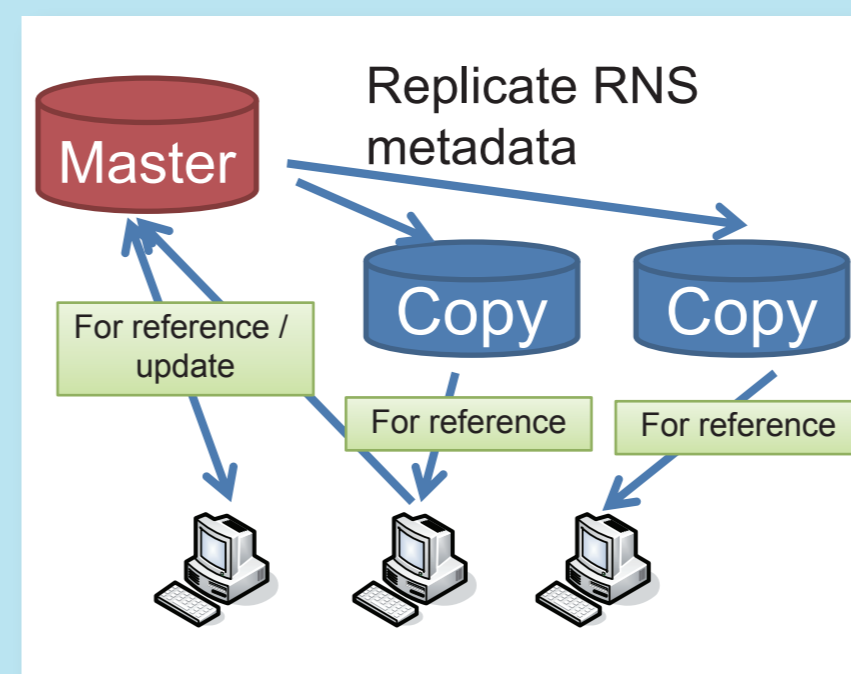
Metadata replication

Client requests are distributed among replicas. Updates are handled by the master.
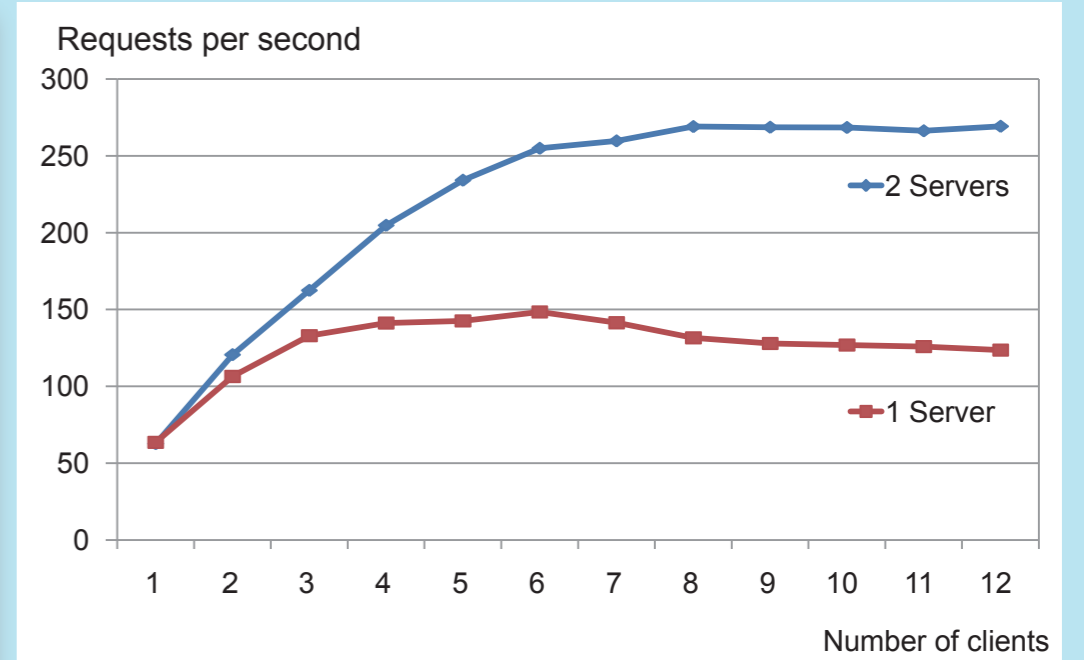
Query performance with replication

With two metadata servers, performance gain is about two times compared to single server.

- Resource Namespace Service (RNS) is a web service which enables mapping of resource into single, hierarchical namespace. The specification is published by Open Grid Forum.
- RNS is intended for use in large scale environments so that we have proposed load balancing methods for RNS.
- Our current implementation makes copies of metadata among different servers and distribute client acesses. The experiment showed a linear performance improvement.

RI2N: Redundant Interconnection with Inexpensive Network

Concepts

To provide a low-cost and high-performance network with high reliability on large scale PC clusters, we employ a set of multiple Ethernet links both for bandwidth and fault tolerance.

- In normal case; Transmit all packets on multiple links in round-robin manner
- When fault is detected; recovers the communication without the broken link

RI2N provides high bandwidth and dependability with high performance/cost ratio to realize large scale PC clusters in reasonable network cost.

Design of RI2N/DRV

RI2N/DRV is implemented as a pseudo network interface on Linux

- User transparent implementation
- TCP/IP communication without performance degradation by packet disordering
- Perfectly independent module without kernel modification

RI2N/DRV provides a packet sequencing function to avoid the misinterpretation on TCP/IP layer for non-consequent packets on each channel, and it reduces the demand of packet retransmission.

- Improve throughput
- Reduce CPU load

Pseudo Ethernet Device

Packet Reordering
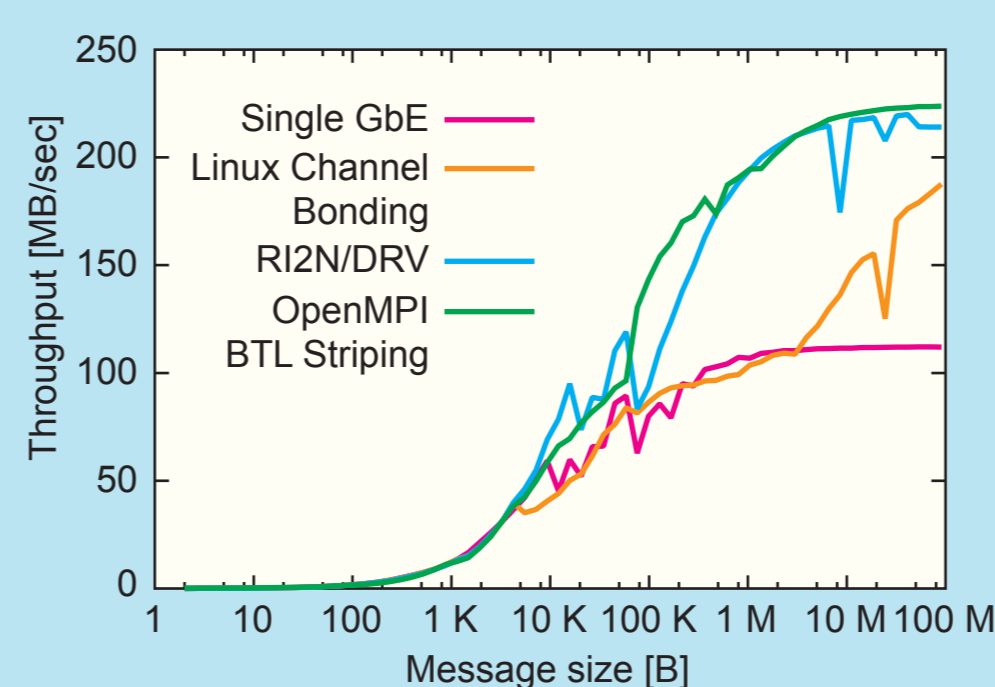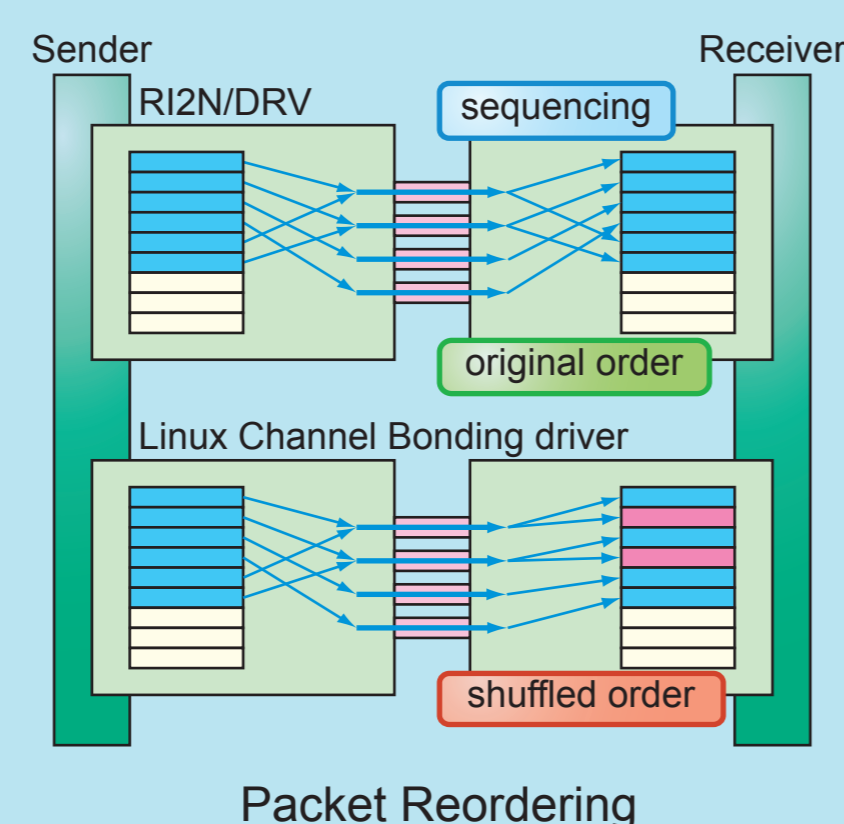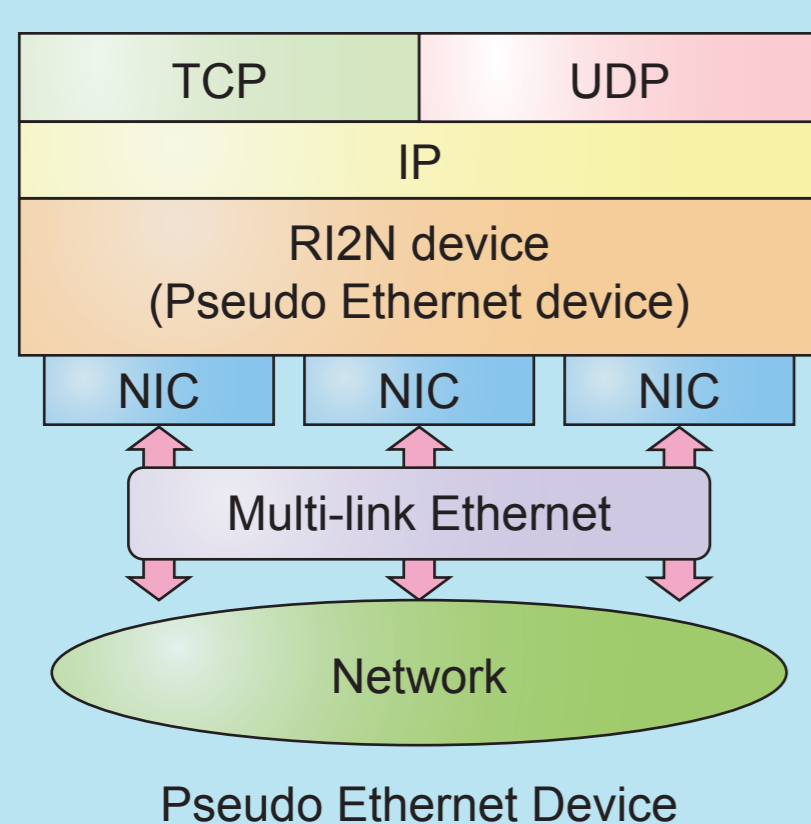
Throughput before and after failure
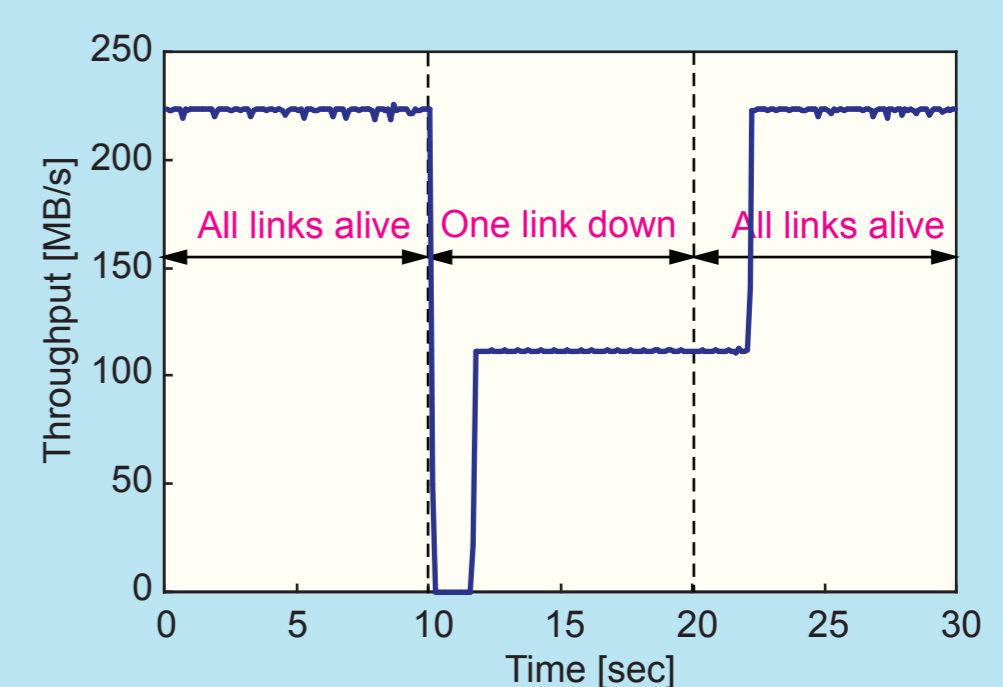
Throughput on ping-pong transfer (MPI)