

Open Issues and New Challenges for End-to-End Transport

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Outline

- IRTF ICCRG: current state and my thoughts
- Okay, only one open issue
 - the current socket interface should be changed
- , and only one new challenge
 - machine-only-communication

IRTF ICCRG

- Car designers standing next to their cars
 - asking “which one is the best” won’t work
 - but “for building a new car, what can we learn from yours?” might
- Agreement to produce overview of 1) IETF CC efforts and 2) research efforts (TCP++)
 - quite distinct topics! Thus, probably two documents
 - #1: what do I need to know when designing a mechanism like the ones in #2
 - currently working on #1 with Wesley Eddy
 - *classification* will be a key issue for #2

A new Transport Layer Interface

- Current TCP/IP transport layer from an app programmer's point of view: UDP or TCP
- Tomorrow's transport layer interface:
 - UDP / TCP / UDP-Lite / SCTP / DCCP
 - each with various options (e.g. DCCP CCIDs)
 - and what happens when there's a new DCCP CCID?
- **Suggestion: maintain best-effort model, let app programmer state properties & requirements**
 - Numerous potential benefits: better use of protocols, automatic deployment, perhaps also a catalyst for research

Machine-only communication

- **Seems to be a trend**
 - commercial web service based applications
 - sensor networks
 - autonomic computing vision
 - Grid
- **Semantic Web (Services): first big step for supporting machine-only communication at a high level**
- **So far, no steps at a lower level**
 - like RTP, RTCP, SIP, DCCP, ... for multimedia apps:
not absolutely necessary, but advantageous

Case study: the Grid

- “The real and specific problem that underlies the Grid concept is coordinated resource sharing and problem solving in dynamic, multi institutional virtual organizations”
[Ian Foster, Carl Kesselman and Steven Tuecke,
“The Anatomy of the Grid - Enabling Scalable Virtual Organizations”,
International Journal on Supercomputer Applications, 2001]
- **Grid history: parallel processing at a growing scale**
(parallel CPU architectures \Rightarrow multiprocessor systems \Rightarrow clusters \Rightarrow Grid)
 - Grid people = parallel processing people
 - Thus, **high performance computing = reasonable focus**

Grid-net peculiarities

- **Special behavior**

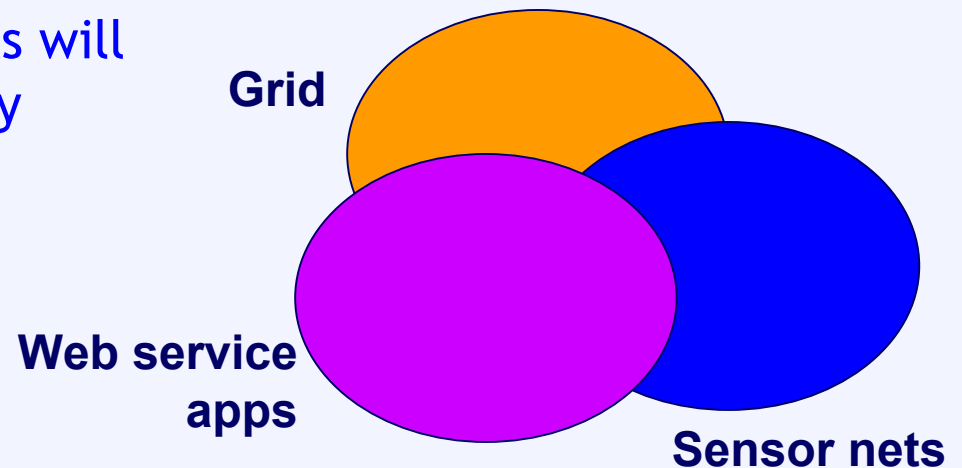
- Grid scheduler may be able to specify future data transfers
- Data transfers are usually pushed (via GridFTP), not pulled
- Distributed System which is active for a while
 - overlay based network enhancements possible
 - Multicast
 - P2P paradigm: *“do work for others for the sake of enhancing the whole system (in your own interest)”* can be applied - e.g. act as a PEP, ...
 - sophisticated network measurements possible
 - can exploit longevity and distributed infrastructure

- **Special requirements**

- file transfer delay predictions
 - note: useless without knowing about shared bottlenecks
- QoS, but for file transfers only (“advance reservation”)

Grid-net research

- European project: **EC-GIN**
(*Europe-China Grid InterNetworking*)
 - 2.2 MEuro, 11 partners (7 Europe + 4 China)
 - Networkers developing mechanisms for Grids
 - Intention: “snowball effect” in research community (e.g., via GridNets)
- Subset of Grid-net developments will be useful for other machine-only communication systems!



Thank you!

Questions?