Supporting Pervasive and Scalable Collaborative Environments

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Collaboration Continuum

- Collaboration activity
  - —published documents
  - —web pages
  - —directory / presence information
  - —e-mail
  - —text-based chat
  - —current activity awareness
  - —teleconference/telephone
  - —application sharing
  - —videoconference
  - —access grid
  - —meeting in person

Decreasing % of time

Increasing interactivity

Collaboration Goals

- Collaborative interactions need to be supported by a continuum of tools
  - — basic connectivity capabilities should be ubiquitous
  - — collaborators need to be able to share their work processes / convey progress / identify issues
  - — provide context sensitive information - avoid information overload
  - — support of day-to-day interactions increases the need for face-to-face meetings
- Security is becoming more important
  - — protection from hackers
  - — privacy of data

User - Collaboration Realities

- Collaboration takes effort
  - must provide a perceptible benefit
  - must fit with current work practices
- Collaboration tools need to be used regularly (not on the shelf)
- Group must already have a strong need for and interest in collaboration
- Tools need to be easily scalable in size and number of organizations
  - small groups have difficulty deploying and supporting infrastructure
  - large groups require an ability to connect with people and sites they do not know
- Scientists don't want to continuously collaborate but, they want it available on demand
- Interactions are often asynchronous – different timezones

Tool – Collaboration Realities

- Development of new individual tools and capabilities is progressing rapidly
- Collaboration environment is often an amalgamation of many individual tools
- User interfaces of the tools are all different
- Tools do not generally interoperate or communicate
  - — security (e.g. authentication and access control)
  - — events
  - — logging/recording
- Still working to understand the requirements / sociological implications
- Need to find a way to make collaboration an implicit part of the environment

Collaborative Collaboration Tools

- Security – authentication and authorization
  - single point of login
  - group and individual authorization
- Communication
  - communicate easily between components
  - scalable to large groups
  - flexible delivery models (e.g. reliability and order)
- Logging – ability to record all that occurred in a session
- Events – notifications between tools
- Search capabilities
- Collaboration context awareness
- Presence information

Peer-to-Peer Model

- Allow ad-hoc collaboration
- Remove centralized servers
  - — scalable to large collaborations
  - — remove bottleneck
- Better model for many collaborations – no natural central authority
- Easy to add new resources to the collaboration
  - — minimize setup required
  - — allows local control over resource authorization

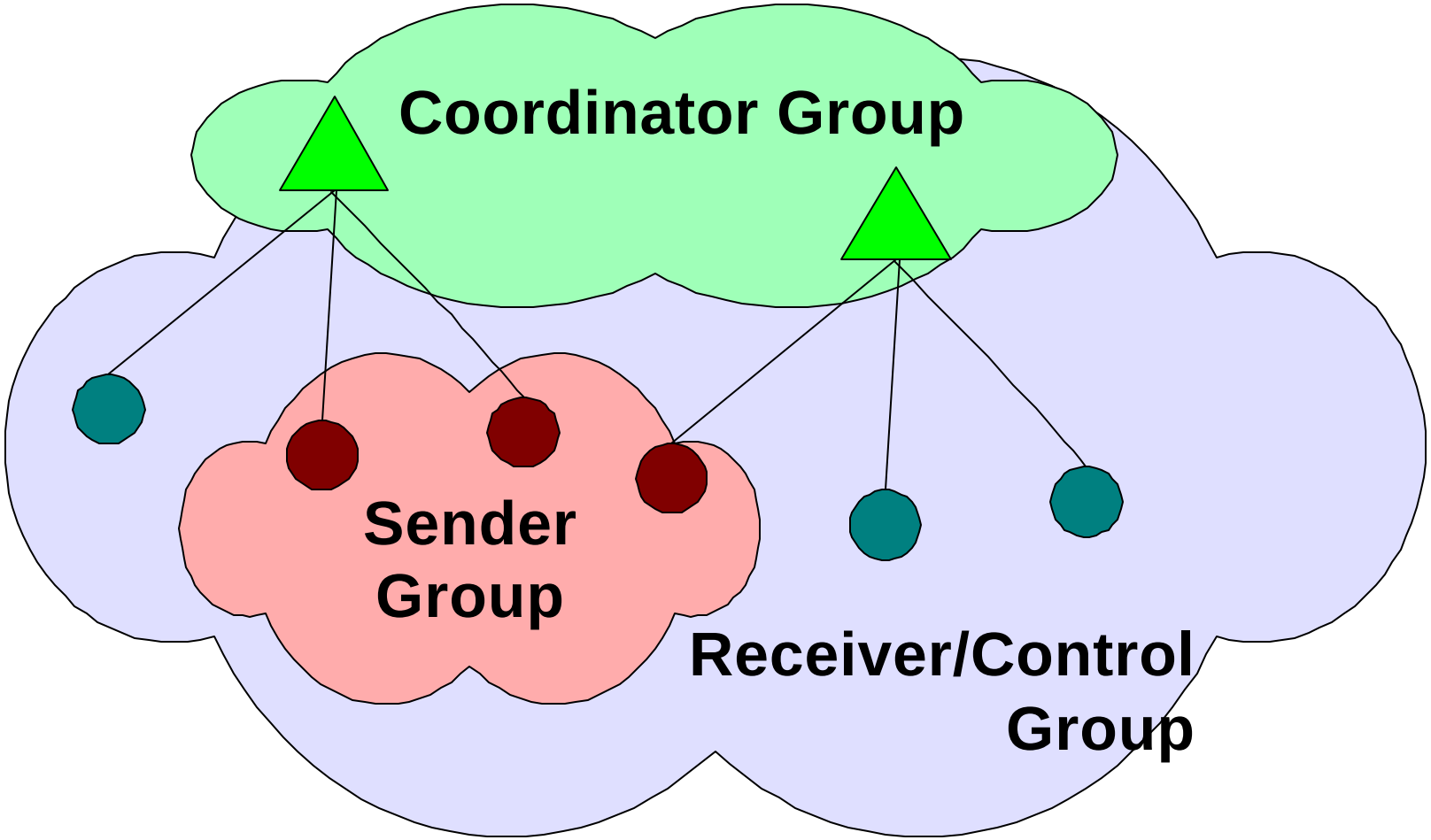
Group Communication

- Ultimate peer-to-peer infrastructure
- Provides efficient communication mechanism for collaborating groups
- Simplify application development
- Flexible delivery capabilities to support a broad range of application needs
  - — ordered and unordered communication
  - — reliable and unreliable communication
- Scalable to collaborations with many members
- Support access control, confidentiality, authenticity, and integrity among group members

InterGroup Goals

- Any member of the group can send messages to the group
- Membership tracked with notification of membership changes
- Deliver messages at each member of the group in a consistent order
  - FIFO order, causal order, or timestamp order
  - membership changes delivered in order
- Scale to the Internet
  - groups with many members
  - heterogeneous latency between members

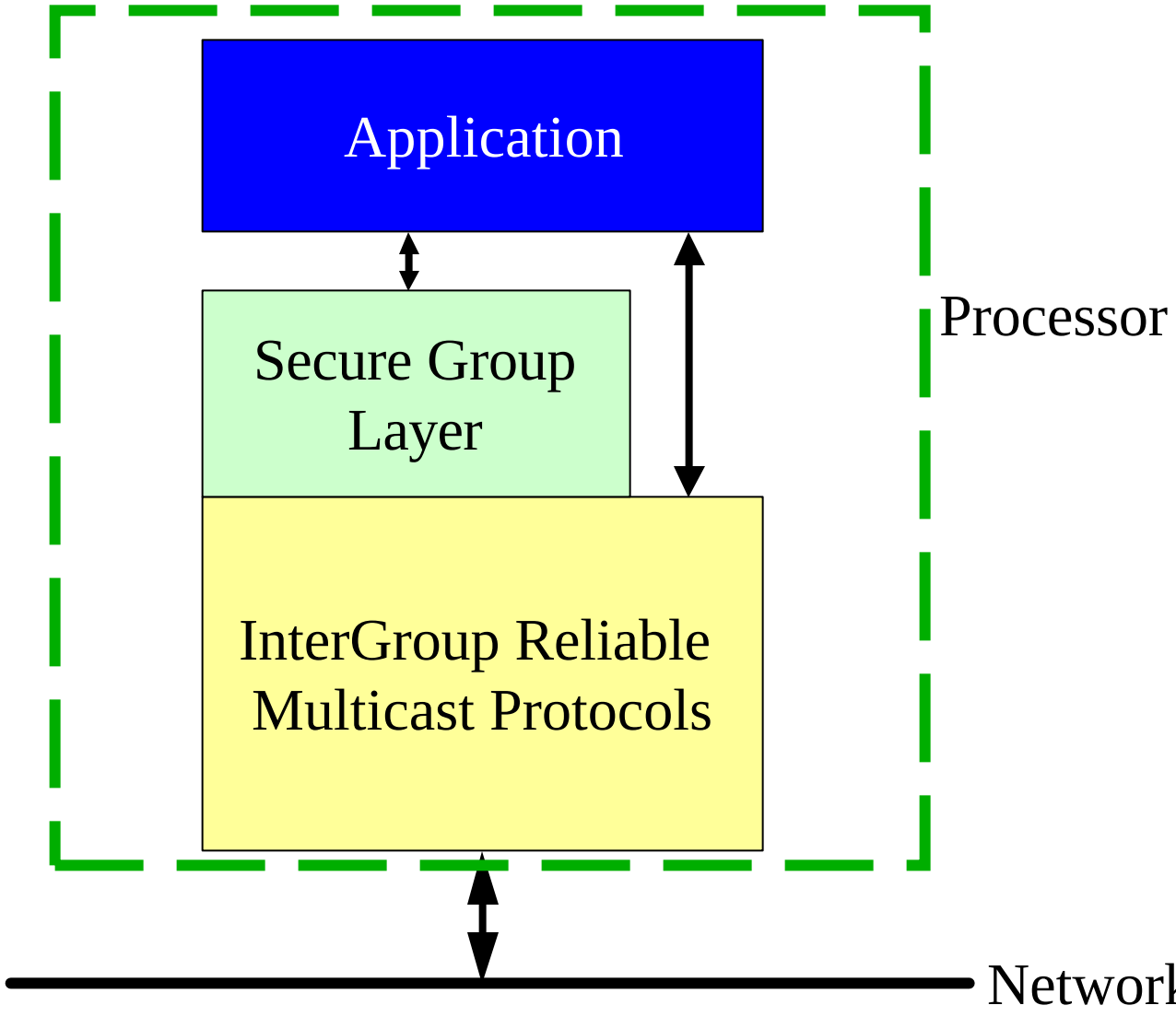
InterGroup Schematic



Secure Group Communication

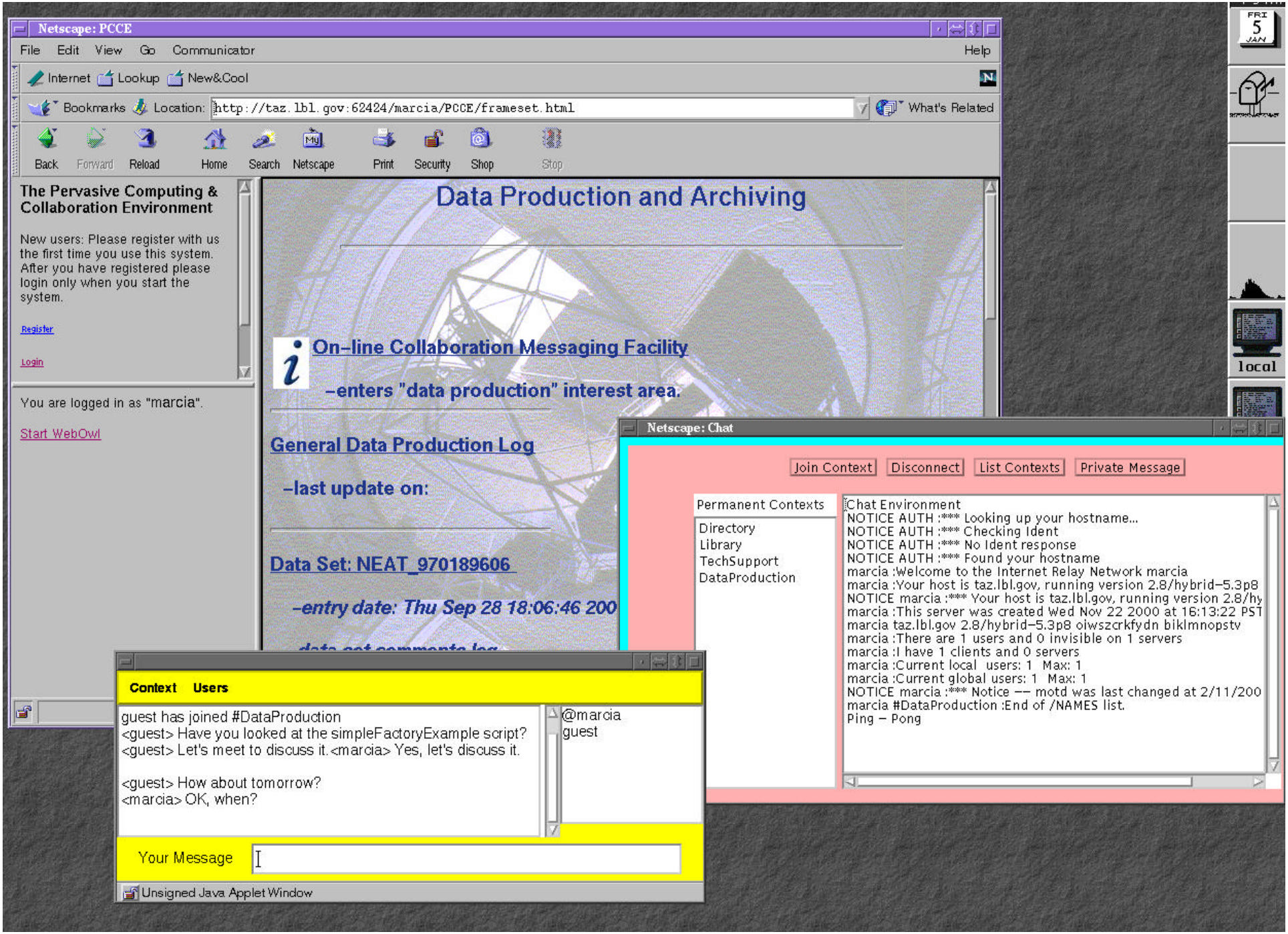
- Goals
  - provide a secure channel for the group with properties similar to Secure Socket Layer (SSL)
  - authorization of group members (individually enforced)
  - group key management (not centralized)
  - group security optional
  - portable implementation
  - uses the Akenti authorization service

Group Communication Architecture



Pervasive Collaborative Computing Environment (PCCE) Goals

- Collaboratory centered around a shared computation workflow
- Support ‘continuous’ collaboration
- Target daily tasks and base connectivity
- Web-based interface available for ease of use/installation
- Collaborative workflow tools
- Leverage off of existing components when possible
- Leverage off the Grid services
  - —security
  - —directory services
  - —job submission and tracking
- Standards-based components


Netscape: PCCE
File Edit View Go Communicator Help
Internet Lookup New&Cool
Bookmarks Location: http://taz.lbl.gov:62424/marcia/PCCE/frameset.html
What's Related
Back Forward Reload Home Search Netscape Print Security Shop Stop
The Pervasive Computing & Collaboration Environment
New users: Please register with us the first time you use this system. After you have registered please login only when you start the system.
Register
Login
You are logged in as "marcia".
Start WebOwl
Data Production and Archiving
On-line Collaboration Messaging Facility
-enters "data production" interest area.
General Data Production Log
-last update on:
Data Set: NEAT_970189606
-entry date: Thu Sep 28 18:06:46 200
Netscape: Chat
Join Context
Disconnect
List Contexts
Private Message
Permanent Contexts
Directory
Library
TechSupport
DataProduction
Chat Environment
NOTICE AUTH :*** Looking up your hostname...
NOTICE AUTH :*** Checking Ident
NOTICE AUTH :*** No Ident response
NOTICE AUTH :*** Found your hostname
marcia :Welcome to the Internet Relay Network marcia
marcia :Your host is taz.lbl.gov, running version 2.8/hybrid-5.3p8
NOTICE marcia :*** Your host is taz.lbl.gov, running version 2.8/hy
marcia :This server was created Wed Nov 22 2000 at 16:13:22 PST
marcia taz.lbl.gov 2.8/hybrid-5.3p8 oiwszcrkfydn biklmnopstv
marcia :There are 1 users and 0 invisible on 1 servers
marcia :I have 1 clients and 0 servers
marcia :Current local users: 1 Max: 1
marcia :Current global users: 1 Max: 1
NOTICE marcia :*** Notice -- motd was last changed at 2/11/200
marcia #DataProduction :End of /NAMES list.
Ping - Pong
Context Users
guest has joined #DataProduction
<guest> Have you looked at the simpleFactoryExample script?
<guest> Let's meet to discuss it.<marcia> Yes, let's discuss it.
<guest> How about tomorrow?
<marcia> OK, when?
@marcia
guest
Your Message
Unsigned Java Applet Window
FRI 5 JAN
local

Akenti-based Authorization

- Distributed authorization of access to resources
- User identification based on X.509 Identity certificates
- Access control using distributed digitally signed certificates
- Short-lived capability certificates generated for frequent, fine-grained access control
- Resource owners manage authorization
- Scaleable to multiple distributed stakeholders

Conclusion

- Collaboration tools need to provide
  - connections between people and with resources
  - enable an integrated work environment
  - not just support meetings
  - work centered collaboration
  - significant value to users
  - easy to integrate with current practices
- Common infrastructure capabilities are important
  - security
  - directory services
  - logging/recording
  - events
- Group communication capabilities will allow more efficient design of collaborative tools