Collaboration

Web Pages

Web Pages

Java

Java

C++

C++

TANGO - Interactive

Tango and WebWisdom Training
SC98 Orlando
November 8 1998

Tango Team

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What can we discuss in a Nutshell I?

- Tango Collaboration System applicable to education and training and ……
- Initial demonstrations of use of Tango in education and training using
  - WebWisdom 1.0 Perl/JavaScript System
  - Shared Browser
- Tango reasonably robust and has API to most server/client applications -- will hopefully link to Internet Explorer/Macintosh's soon

What can we discuss in a Nutshell II?

- **Buena Vista** Multiplatform (UNIX/PC) **Audio/Video Conferencing**
- **Java video and audio** players for low bit rate codecs which allows (shared) viewing of multimedia curricula
- **LecCorder** system as turnkey video of presentaion -->MPEG-->H263-->Weblinked foils

What can we discuss in a Nutshell III?

- **WebWisdomNT 2.0 replacing WebWisdom 1.0 (eventually) with**
  - **Database storage of HTML PowerPoint Multimedia data …..**
  - **Java Manager of Courses Users Events Images etc.**
  - **Excellent web-linked database interface using XML templates**
  - **Export to file systems**
- **Prototype works and can be demonstrated**

- **Needs much more testing and Integration with Tango -- will import existing 26,000 foils and 1,500 family photographs**

What can we discuss in a Nutshell IV?

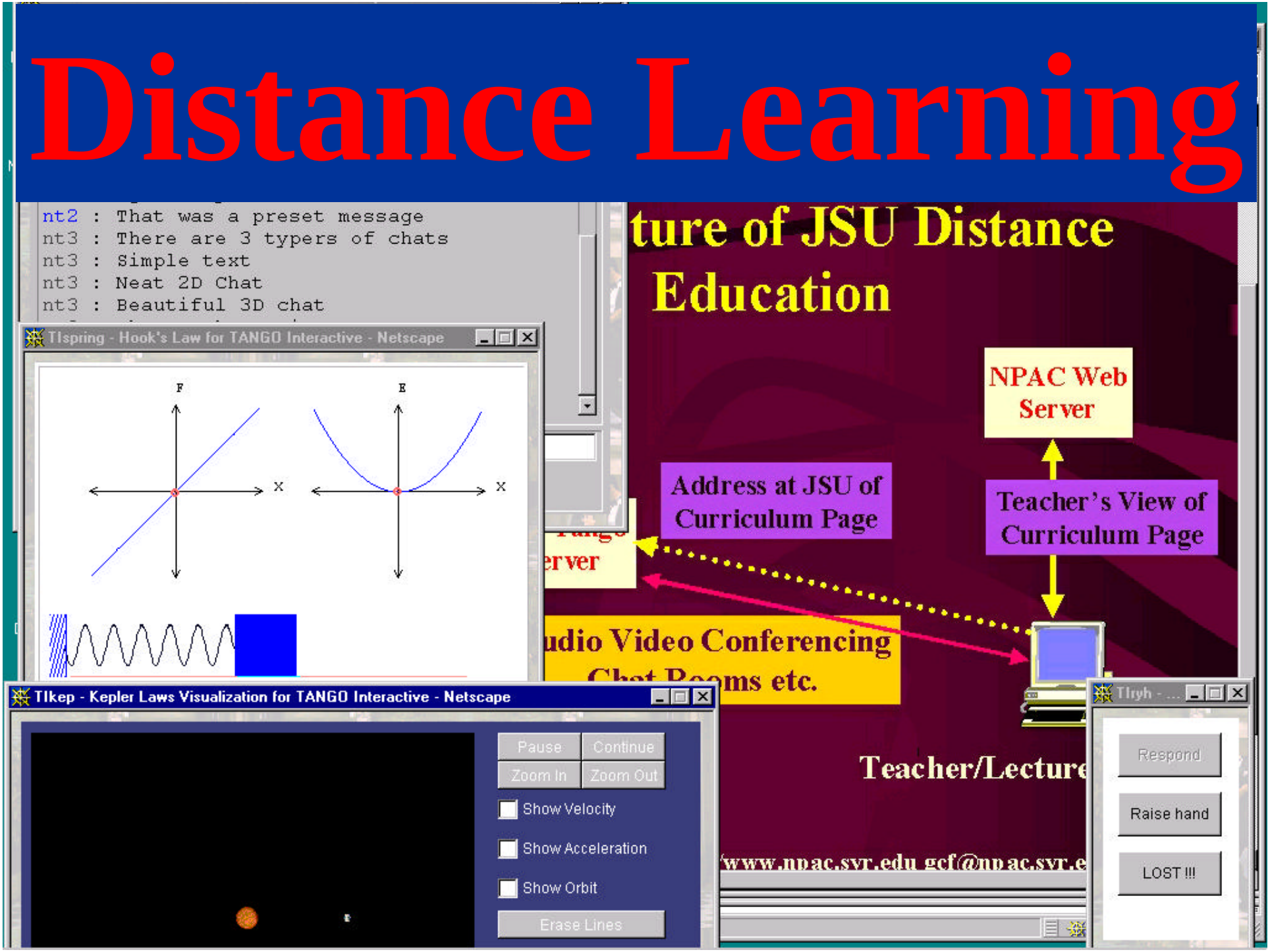
- **NPAC Grading System which is Oracle (or other database -- currently using MSQL) with Java Servlets to support handling of a class with PAPI type**
  - **Student Data**
  - **Grades and Statistics**
  - **Surveys**
- **Online programming labs for**
  - **PERL and Java (natural)**
  - **HPF and MPI (not so trivial)**
- **MPI lab used by JSU in this semester**
- **Cornell's Companion sophisticated extension of this with security**

New Capabilities we could do …..

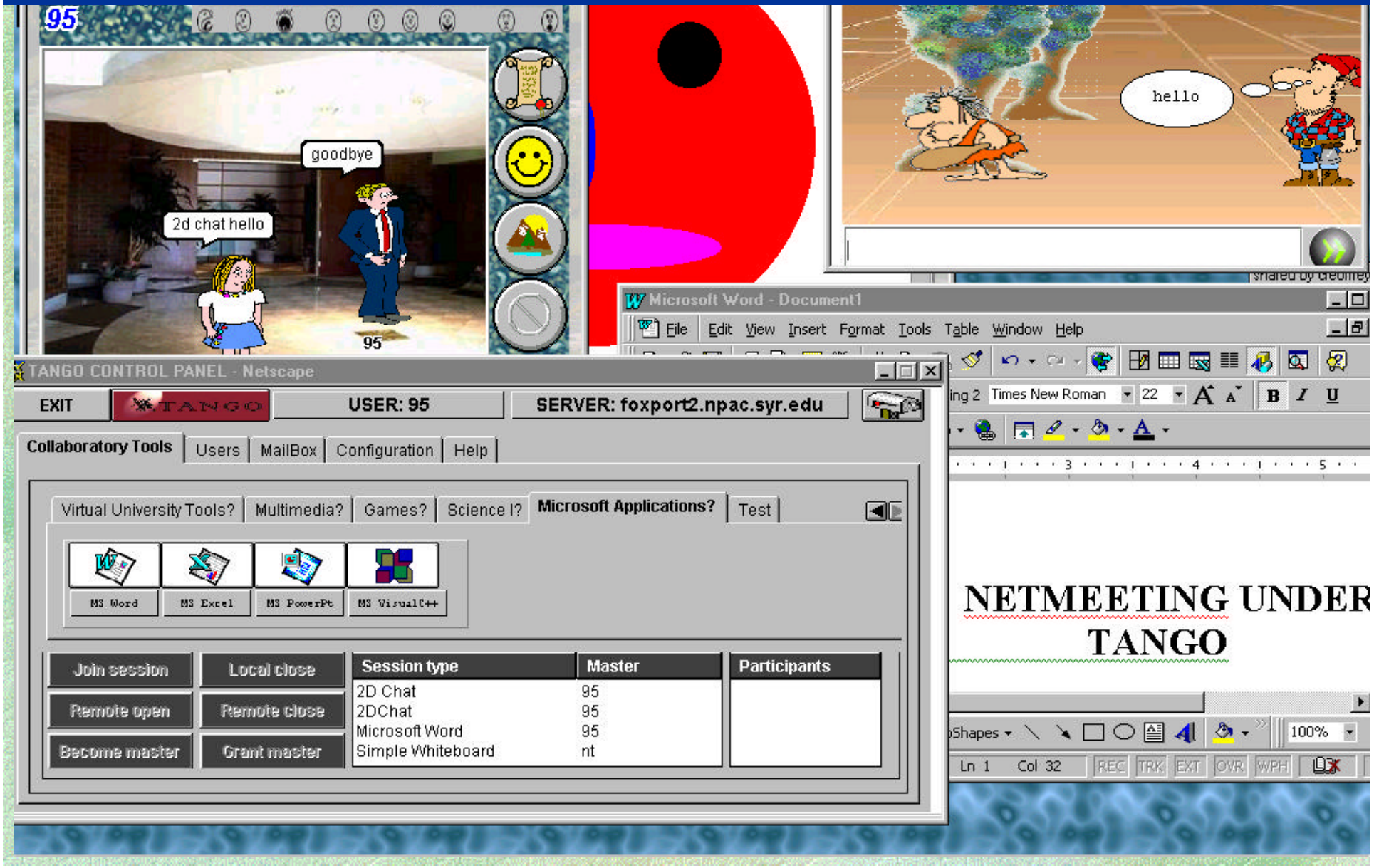
- Macintosh and Internet Explorer implementations
- Take specialized resources such as NCSA Biology workbench and make collaborative
  - Several ways -- one way is a few days work building shared HTML forms
- Shared Macromedia director presentations
- Further shared educational applets as in physics examples
- Shared learning environments such as Belvedere with multiple linked client side applications
- Shared Geographical Information Systems

Tango Interactive Web Collaboratory Share Any Application around the world PC and UNIX Platforms

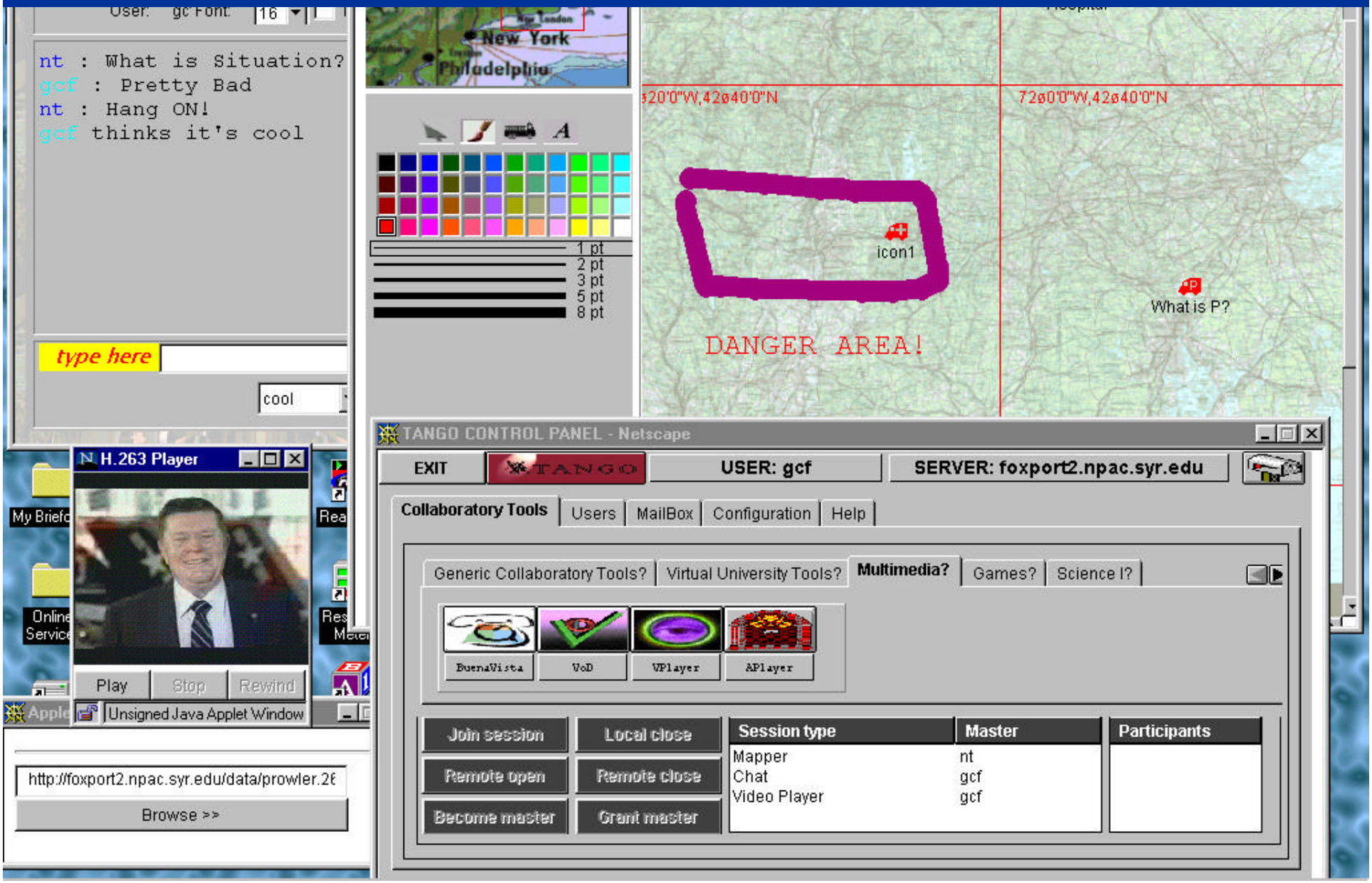
Distance Learning



Electronic Communities



CRISIS MANAGEMENT




Audio On
2.2 fps
92 kbps
Pass
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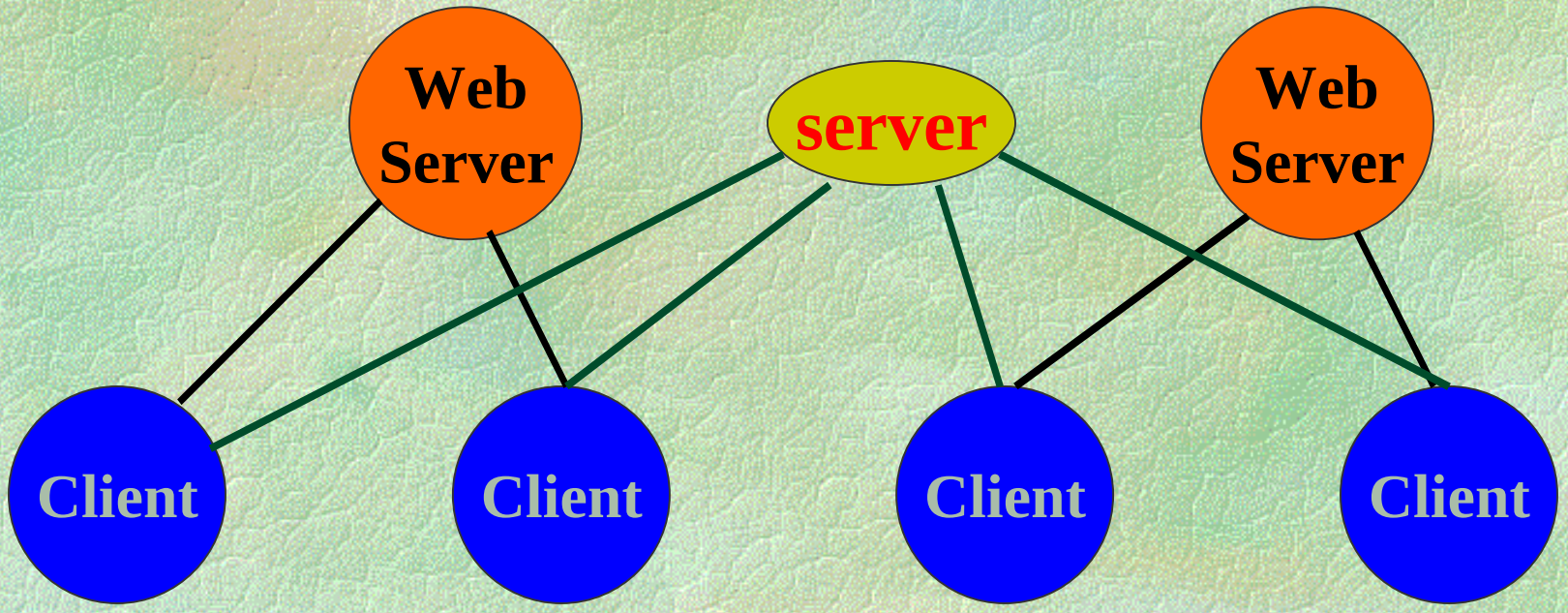
Clear
B3/W3
B: Master
W: Slave
L: Low
User:
95 : you will lose yo
nt3 : i wll win
95 : no way
type here
Audio
Mapper
maryland.npac....
2.4 fps
97 kbps
Arrange
Level:5
4
5
6
-
+
PLAY GAMES

Sharing Your Web Application

Getting Started with Tango I

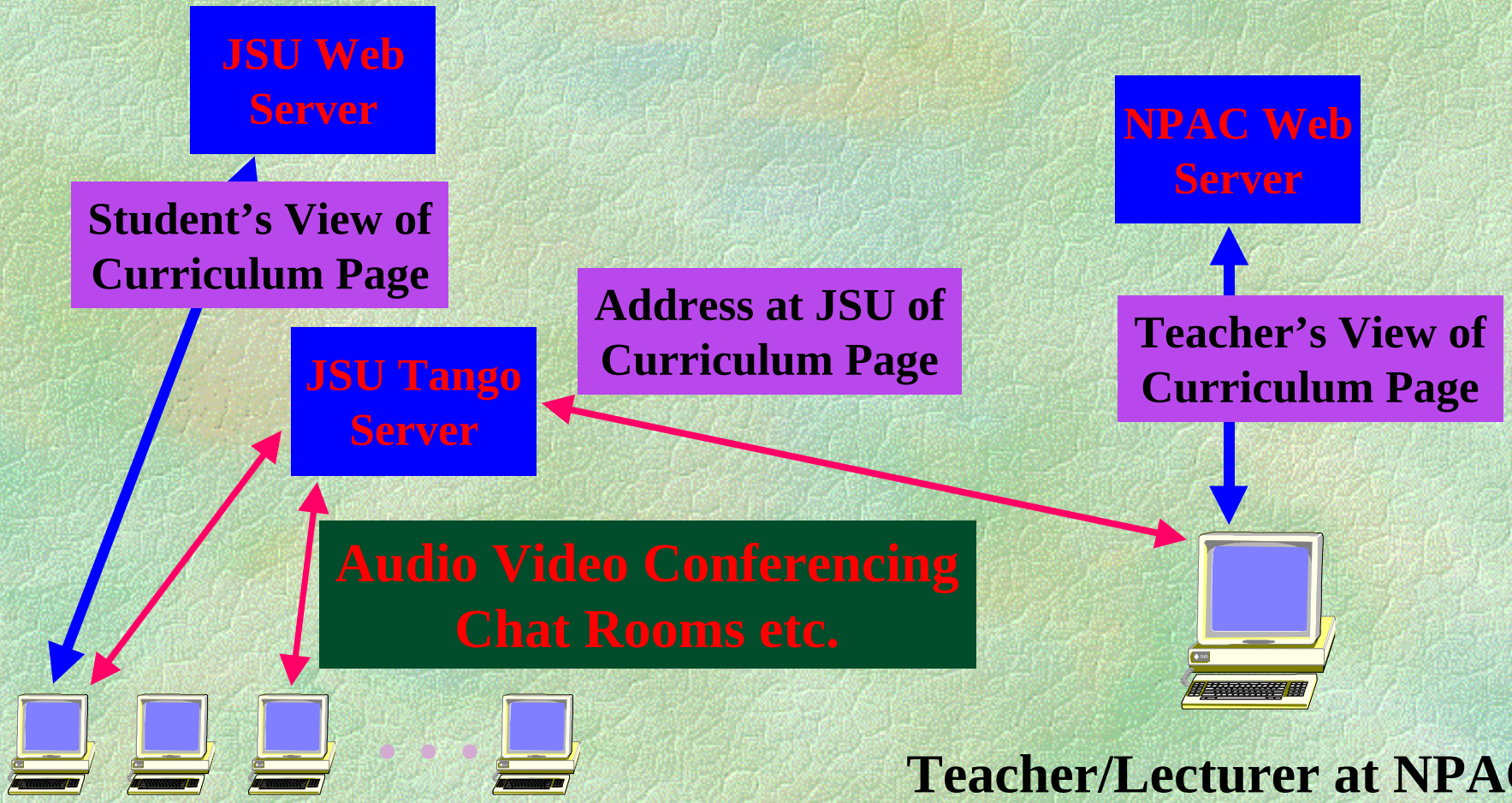
- Using Tango is just a mouse click to download an applet as long as certain preparations have been made
- Tango involves a bunch of collaborating machines (called clients) which are linked together by a Java Tango server. There are default Tango servers which can always be chosen but specialized Tango applications often use their own server.
- A Tango client fetches programs from a Web Server NOT from the Java Server



Getting Started with Tango II

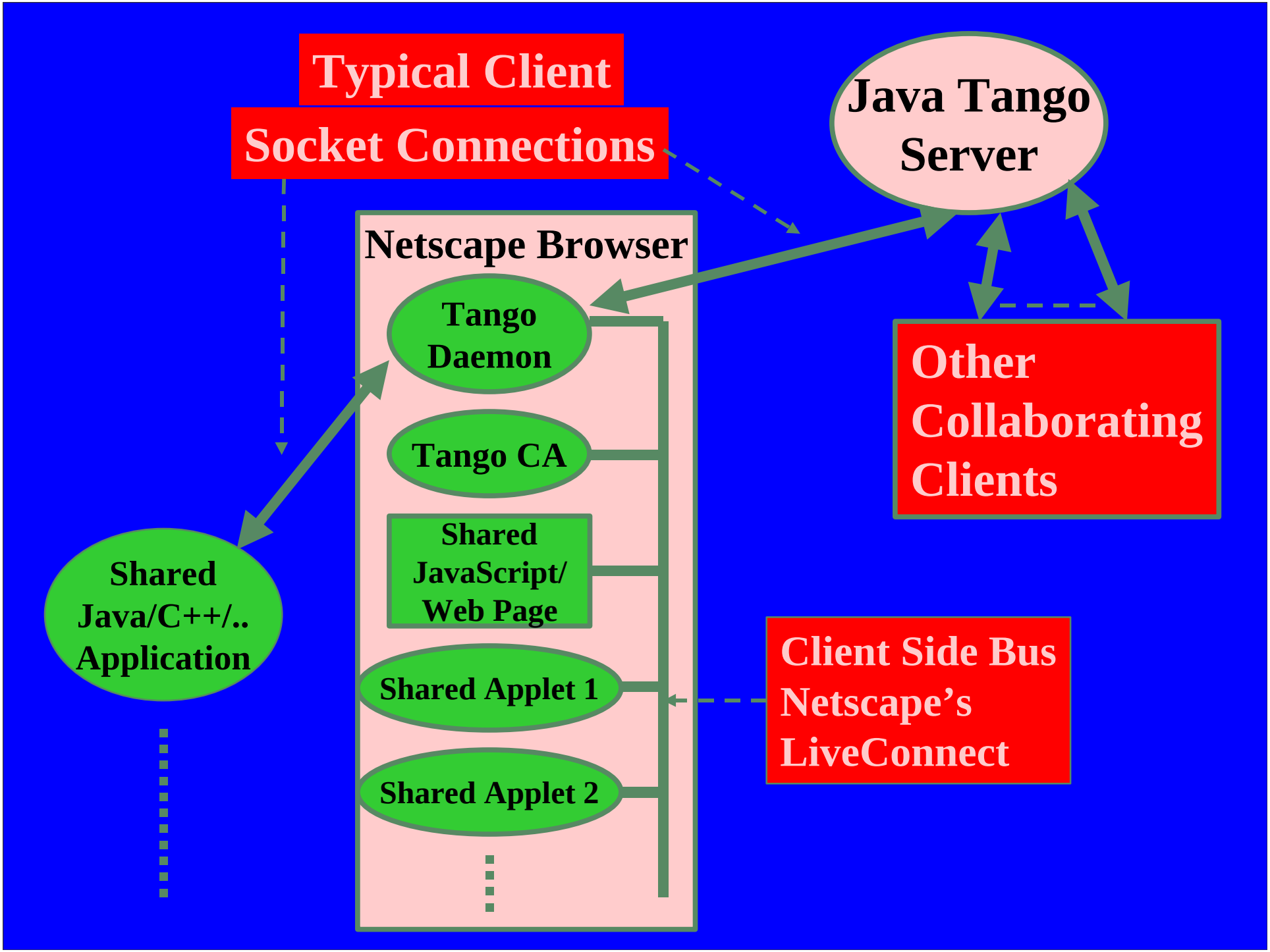
- After understanding which Server you will use, Tango must be installed on your machine. This involves installing a Netscape plug-in and also a C++ audio-video conferencing system Buena Vista
- Then each time you wish to load Tango, one must download the "control application" (CA)which is a Java Applet.
  - This involves selecting a particular Web Server and clients setup with different Web Servers can collaborate using the same Java Server
  - Each downloaded client has a (possibly different) configuration file specifying where each Tango application is to be loaded from. This allows one to use mirror sites to improve performance
  - In simplest case, everybody chooses the same Web Server
- Collaboration involves two or more clients sharing information and this covers both the teacher-students interaction in education; commander-firefighters interaction in a crisis; and the linkage of researchers in a distributed scientific collaboratory.

An Example of Tango Java Server, Web Servers and Clients
Architecture of JSU Distance Education



Some Details on Tango Architecture

- The previous page shows the architecture of our distance education project where we taught CSC499 from Syracuse University to Jackson State fall 97 and spring 98. Note the mirrored Web servers (one at Syracuse and one at JSU) but single Java Server
  - Note The Java Server does not receive or dispense a large amount of data. For basic curricula it just transmits a URL string (a few bytes) while for audio-video conferencing data, the server establishes the session but the multimedia data is transmitted on separate channels.
  - The server is very robust and can handle many users
- The next page shows the
  - Tango daemon downloaded in the plug-in
  - The Control Applet downloaded from a Web Server
  - The Java Server -- a Java application running on NT or UNIX -- which must be instantiated ahead of time
  - shared applications can be C++, JavaScript or Java (applet or application)


Typical Client
Socket Connections
Java Tango Server
Netscape Browser
Tango Daemon
Tango CA
Shared JavaScript/ Web Page
Shared Applet 1
Shared Applet 2
Other Collaborating Clients
Shared Java/C++/.. Application
Client Side Bus Netscape's LiveConnect

Collaboration

Web Pages

Web Pages

Java

Java

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C++

TANGO - Interactive

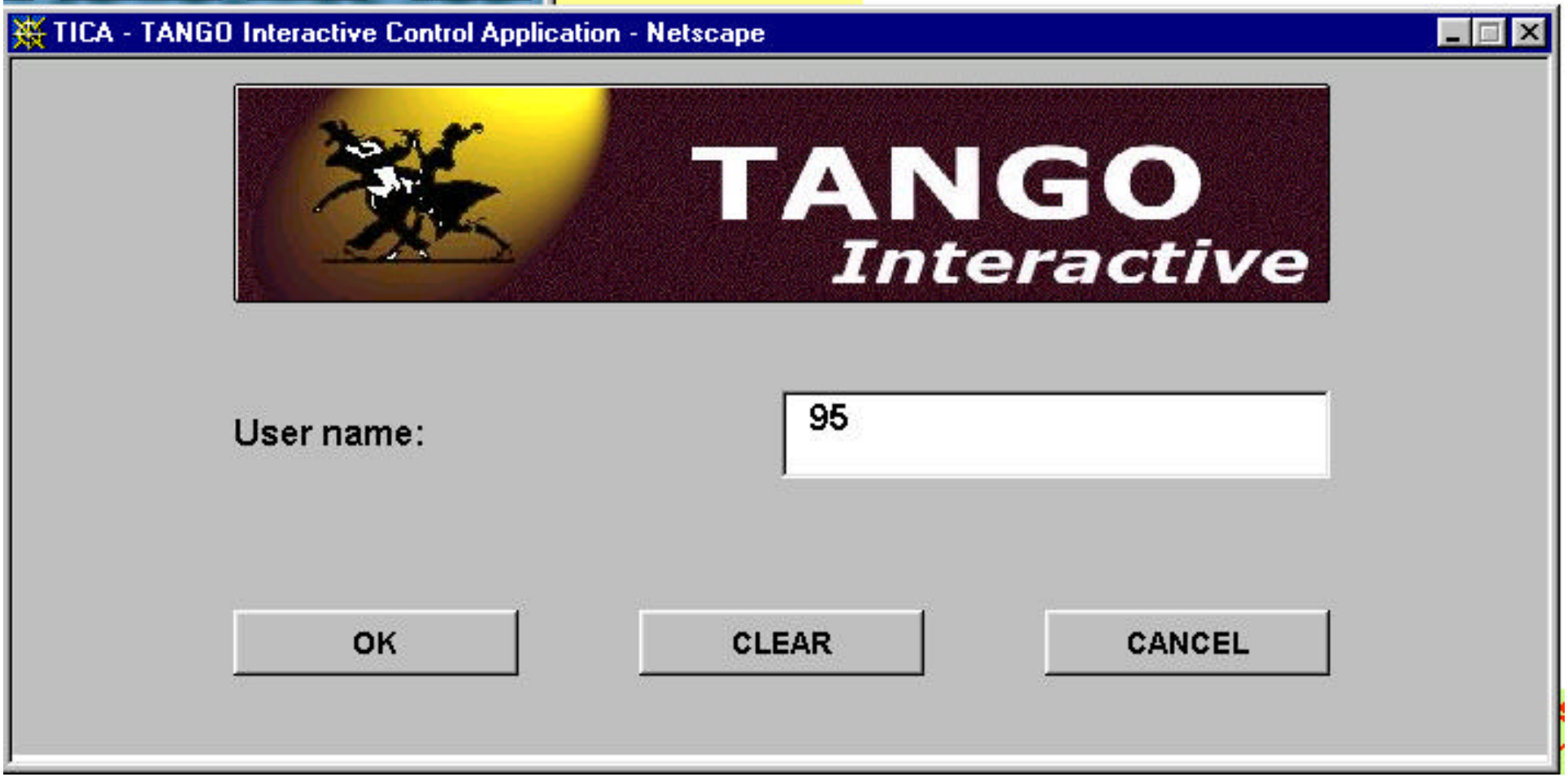
Start with One Click

Tango Interactive is Integrated into Web Browser

Getting Started with Tango III

- After requesting a Tango download of control applet, one may get a security dialog (grant permission to download and remember decision), and first one is asked (as on previous page) to choose a server
  - Servers are available for distribution but typically start with default one
  - one also asked to choose a "control interface" which just correspond to different selections of applications to share
- After a while, if all goes well, one gets the request to "login" which currently just requires that you type in a unique "handle" by which you are known in the collaboration room.
  - In Tango1, each server supports a single room but we will see that although all users are potential participants in a shared application, one can set up complex relationships as any given session can involve a different subset of users.
  - Currently Tango has no security mechanisms in the login process although one has some control over allowed actions in a given shared application.
- Note we define a session as an instance of an application shared by a set of users. One can have any number of sessions based on a given application which separate instantiations of the application and different subsets of users. As we will see users decide who joins a given session.

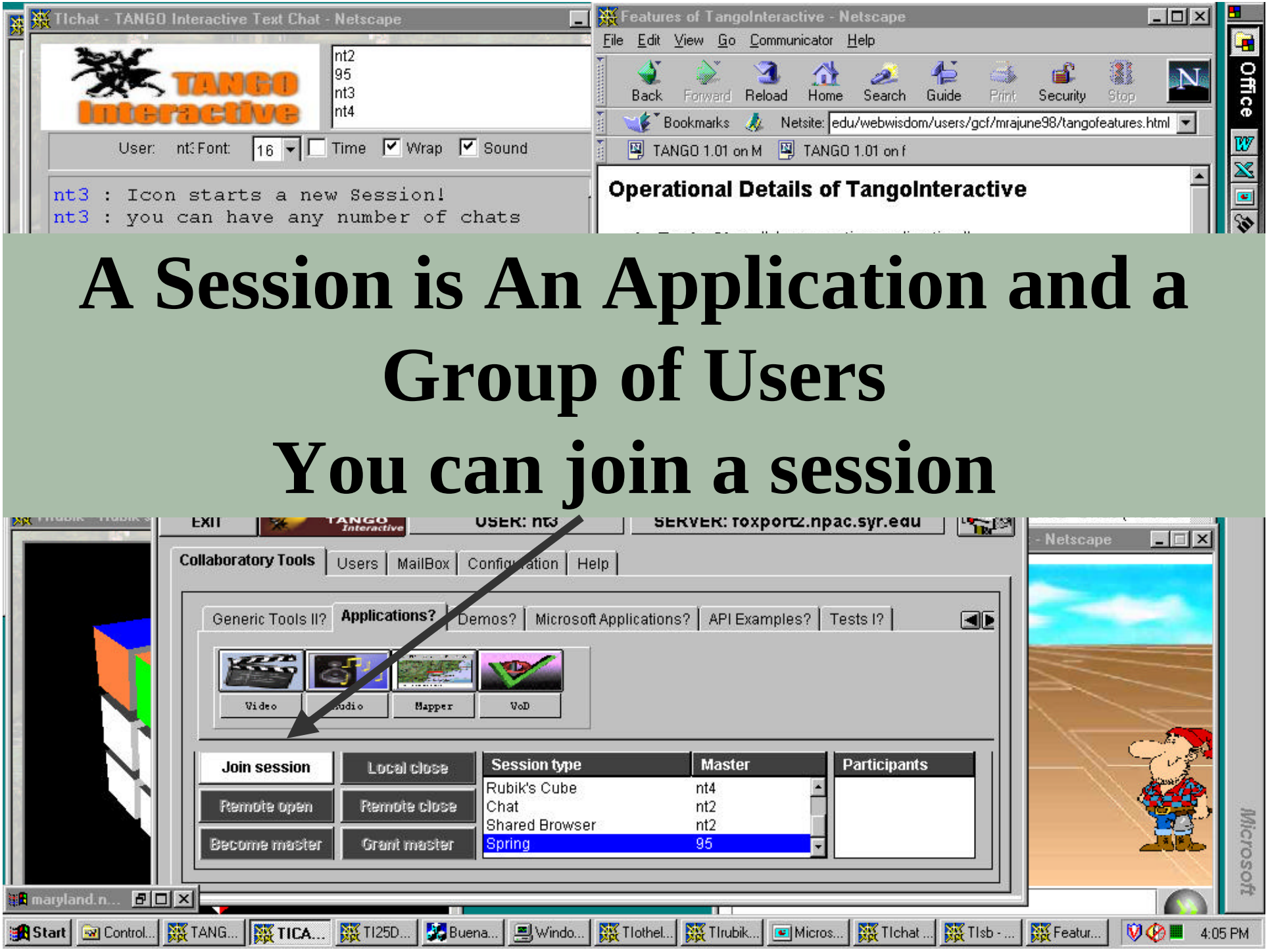
Download the Java Controls
Login into the Java Server



Click the Chat Icon to start a Session

Starting or Joining a Session

- Sessions can either be started or joined
- Sessions can be joined either because the master adds a user or because a user requests it.
- Sessions are started from the icons under the tags in the middle of the CA's user interface
- Suppose the teacher has started a chat or other session. Then it appears on the list of sessions at the bottom middle section for ALL clients. Highlighting it, one see that join is an option (shown in left bottom panel)
- Click the join button and you become part of this session
  - The chat applet is downloaded to client that joined. Highlighting chat now shows this client as a participant.
- For chat, this happens almost instantaneously. For more complex applications, the registration process takes longer as Tango only accepts a joined client when The Java applet is properly loaded


TIchat - TANGO Interactive Text Chat - Netscape
TANGO Interactive
nt2
95
nt3
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User: nt3 Font: 16 Time Wrap Sound
nt3 : Icon starts a new Session!
nt3 : you can have any number of chats
Features of TangoInteractive - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Guide Print Security Stop
Bookmarks Netsite: edu/webwisdom/users/gcf/mrajune98/tangofeatures.html
TANGO 1.01 on M TANGO 1.01 on f
Operational Details of TangoInteractive
Office
A Session is An Application and a Group of Users
You can join a session
EXIT
USER: nt3
SERVER: foxport2.npac.syr.edu
Collaboratory Tools
Users
MailBox
Help
Generic Tools II?
Applications?
Demos?
Microsoft Applications?
API Examples?
Tests I?
Video
Mapper
VoD
Join session
Local close
Remote open
Remote close
Become master
Grant master
Session type
Master
Participants
Rubik's Cube nt4
Chat nt2
Shared Browser nt2
Spring 95
- Netscape
Microsoft
maryland.n...
Start
Control...
TANG...
TICA...
TI25D...
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TIothel...
TIrubik...
Micros...
TIchat ...
TIsb - ...
Featur...
4:05 PM

TangoInteractive can share

Client Java Applets

JavaScript

Java Applications

C++

Server Simulations

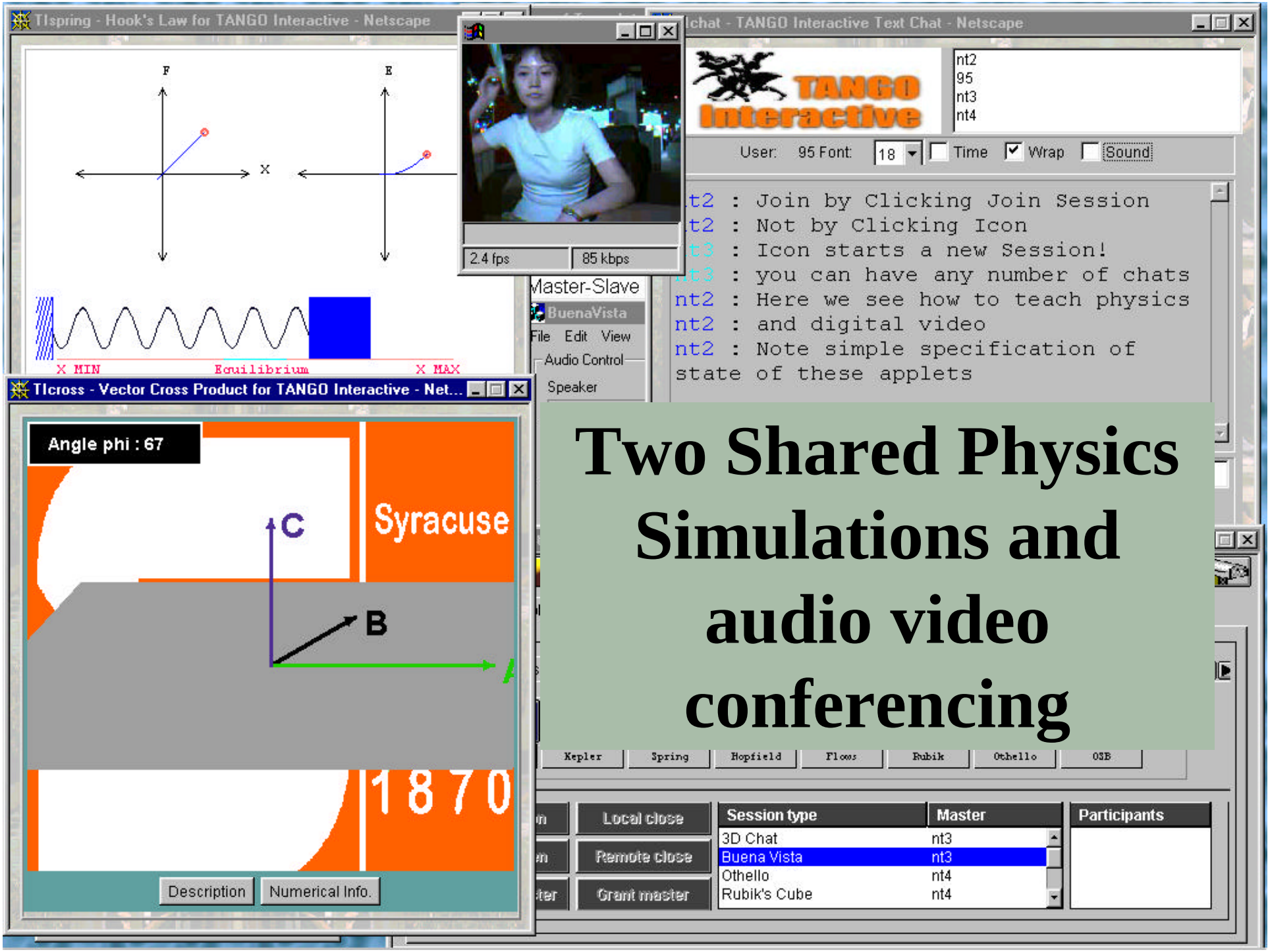
Web-linked Databases

CORBA

Lotus Notes ….

What does Sharing Mean in Tango?

- For a chat, sharing is clear -- one shares the text typed in by the different users.
- Now start and share in the same way, one or more of the simple physics applets -- spring or cross-product.
- The teacher (deemed the master if he or she started it) can move the Position of the spring and the Force and Energy change in response.
  - All applets in the same session follow the behavior of the master
  - Maybe your spring does not follow? Did you join this session or another one? Perhaps you started a new session by clicking on spring icon rather than by highlighting spring session and clicking on join!
  - Note that "slaves" cannot move spring position -- they are meant to gaze in wonder and growing understanding as teacher moves spring and uses video conferencing to wax eloquent about the physical principles
- In spring case, Tango shares state defining applet -- here the position of the Spring.


TIspring - Hook's Law for TANGO Interactive - Netscape
F
E
X
X MIN
Equilibrium
X MAX
2.4 fps
85 kbps
Master-Slave
BuenaVista
File Edit View
Audio Control
Speaker
Ichat - TANGO Interactive Text Chat - Netscape
TANGO Interactive
nt2
95
nt3
nt4
User: 95 Font: 18 Time Wrap Sound
t2 : Join by Clicking Join Session
t2 : Not by Clicking Icon
t3 : Icon starts a new Session!
t3 : you can have any number of chats
nt2 : Here we see how to teach physics
nt2 : and digital video
nt2 : Note simple specification of
state of these applets
TIcross - Vector Cross Product for TANGO Interactive - Net...
Angle phi : 67
C
B
Syracuse
1870
Description
Numerical Info.
Two Shared Physics Simulations and audio video conferencing
Kepler
Spring
Hopfield
Flows
Rubik
Othello
OSB
Local close
Remote close
Grant master
Session type
Master
Participants
3D Chat nt3
Buena Vista nt3
Othello nt4
Rubik's Cube nt4

More on Sharing in Tango

- **Tango can share any client or server application whose state can be determined and set. Tango finds the state from the master and transmits it to the slave clients**
  - **For efficiency, Tango usually transmits "the change in state" and not state itself -- for spring it is as easy to transmit absolute state x as change dx in state. For chat, change in state (latest text typed) is natural.**
  - **For server applications, one finds and sets state through web interface which can be URL (perhaps with CGI extension) or even CORBA interface to a distributed object.**
- **Porting an application to Tango, requires sending messages from master with state (change) and receiving them on slave. Hardest perhaps is knowing what the state is!**

Collaboration

Web Pages

Web Pages

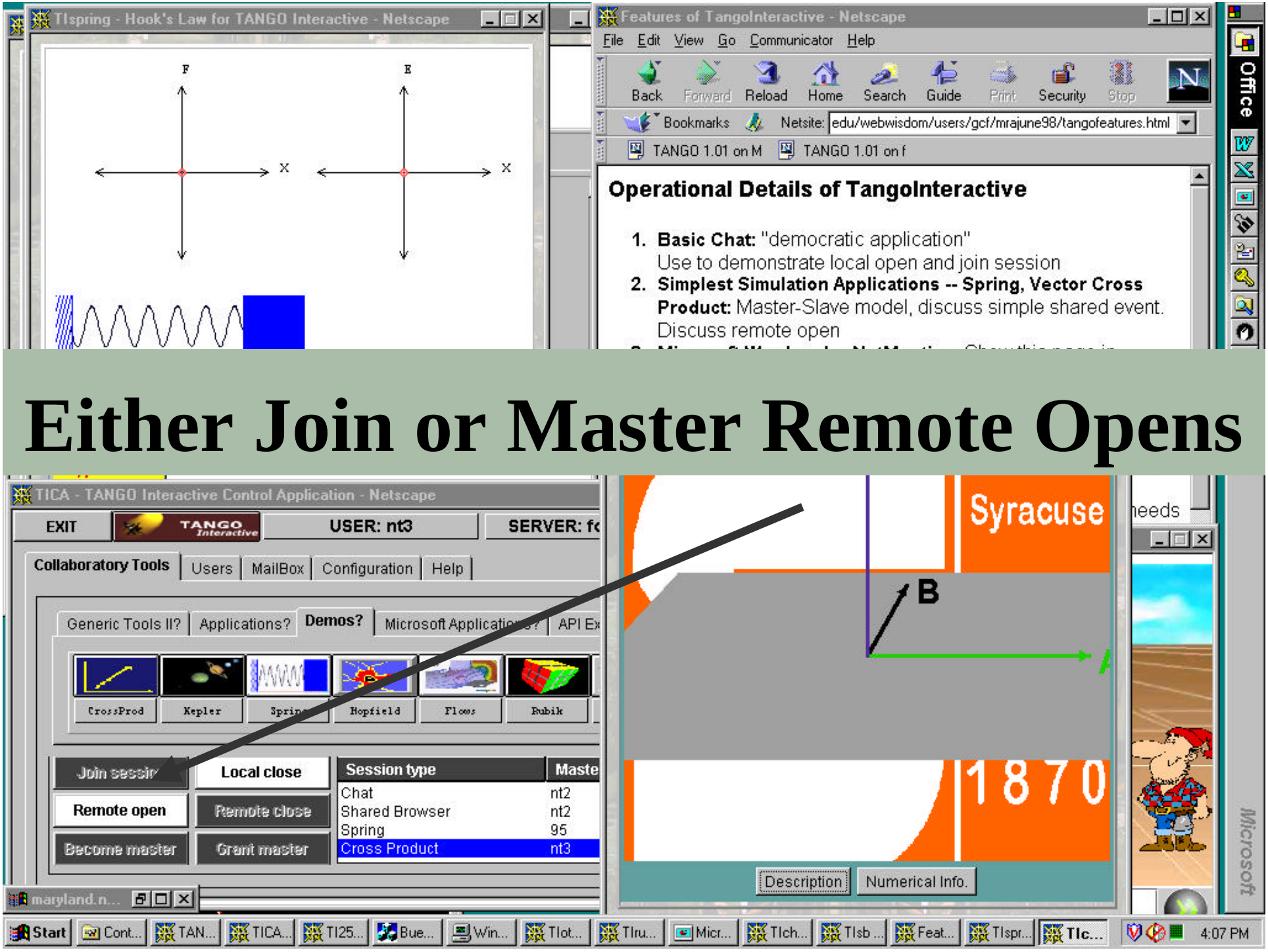
Java

Java

C++

C++

TANGO - Interactive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1. Basic Chat: "democratic application"
Use to demonstrate local open and join session
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Product: Master-Slave model, discuss simple shared event.
Discuss remote open
Office
Either Join or Master Remote Opens
TICA - TANGO Interactive Control Application - Netscape
EXIT
TANGO Interactive
USER: nt3
SERVER: fc
Collaboratory Tools
Users
MailBox
Configuration
Help
Generic Tools II?
Applications?
Demos?
Microsoft Applications?
API Ex
CrossProd
Kepler
Hopfield
Flows
Rubik
Join session
Local close
Remote open
Remote close
Become master
Grant master
Session type
Chat nt2
Shared Browser nt2
Spring 95
Cross Product nt3
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Syracuse
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Numerical Info.
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Microsoft
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Cont...
TAN...
TICA...
TI25...
Bue...
Win...
Tlot...
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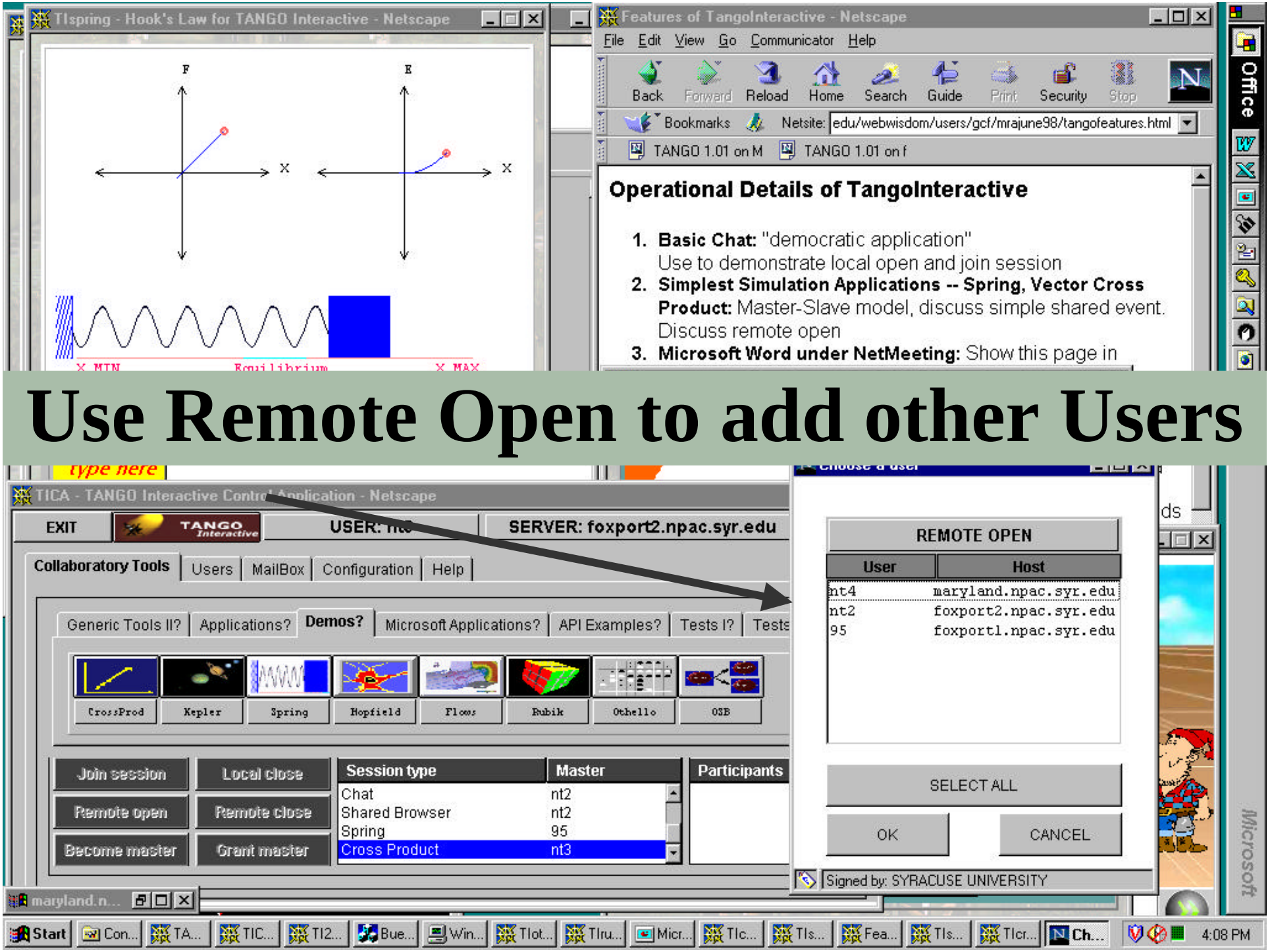
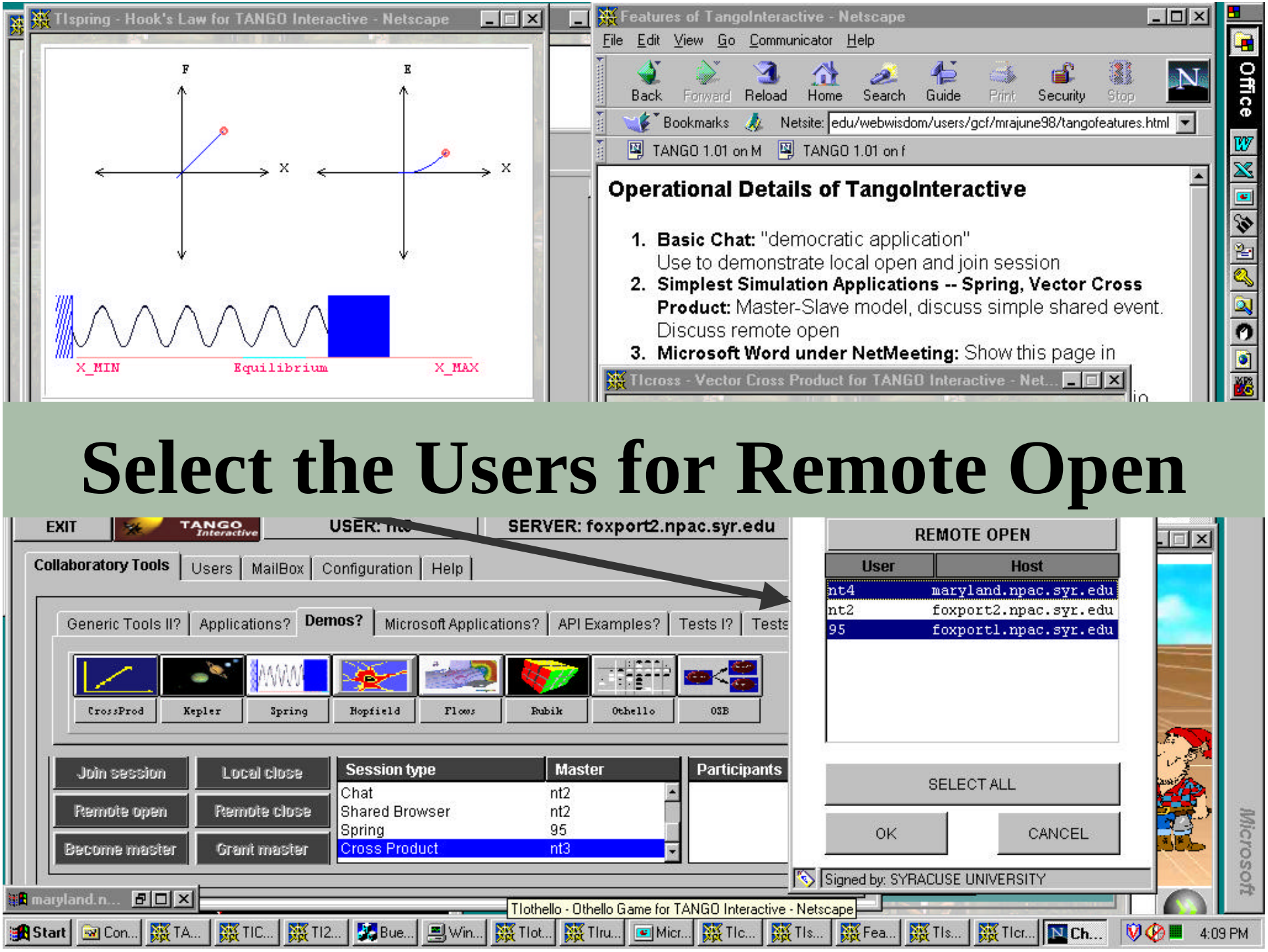
Tlsb ...
Feat...
Tlspr...
Tlc...
4:07 PM

Join or Remote Open Possible

- We showed how users could be added to sessions by clients joining a session initiated by the master.
- Alternatively, one can use a remote open command shown on previous and next two pages
  - This is appropriate when one is sure that a group of users need to participate. This is typically the case in a distance education class when students have logged into Tango and teacher wishes to launch a shared application (e.g. the cross-product applet) on all student machines.
- When teacher highlights the cross-product session (and no other users have joined), he or she is offered the allowed choices:
  - local close which will terminate session or
  - remote open which can spread session to any of the other users
- The dialog box that jumps up allows one either to select specific users or all -- the latter is a good option for education when one typically wants all students involved.
- We will see later how the configuration tab, allows clients to prevent unwanted remote opens cluttering their windows



Use Remote Open to add other Users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Discuss remote open
3. Microsoft Word under NetMeeting: Show this page in
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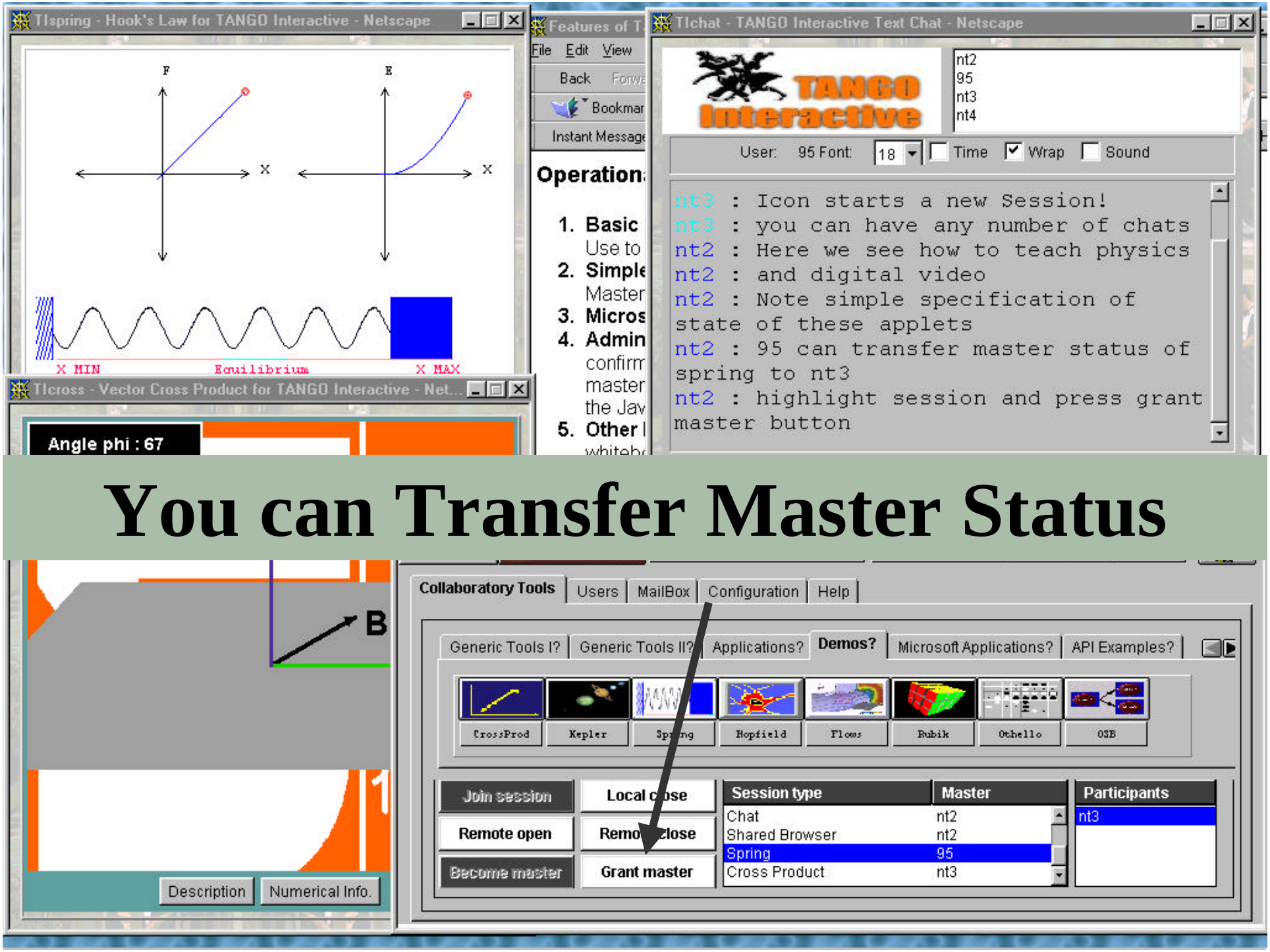
Cross Product nt3
Participants
REMOTE OPEN
User
Host
nt4 maryland.npac.syr.edu
nt2 foxport2.npac.syr.edu
95 foxport1.npac.syr.edu
SELECT ALL
OK
CANCEL
Signed by: SYRACUSE UNIVERSITY
maryland.n...
TIothello - Othello Game for TANGO Interactive - Netscape
Start
4:09 PM

Sharing Your Web Application

Changing the Master Status

- The master status can be changed at the request of either master or slave
  - Highlight the session as usual and the
  - master is allowed to grant master or
  - any slave is allowed to become master
- As in remote open, configuration tab, allows one to control unwanted transfer of master status
- As an example, one could use this in education to allow student to control the spring applet and demonstrate that they understood basic ideas.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nt2 : and digital video
nt2 : Note simple specification of state of these applets
nt2 : 95 can transfer master status of spring to nt3
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TangoInteractive can share

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Java Applications

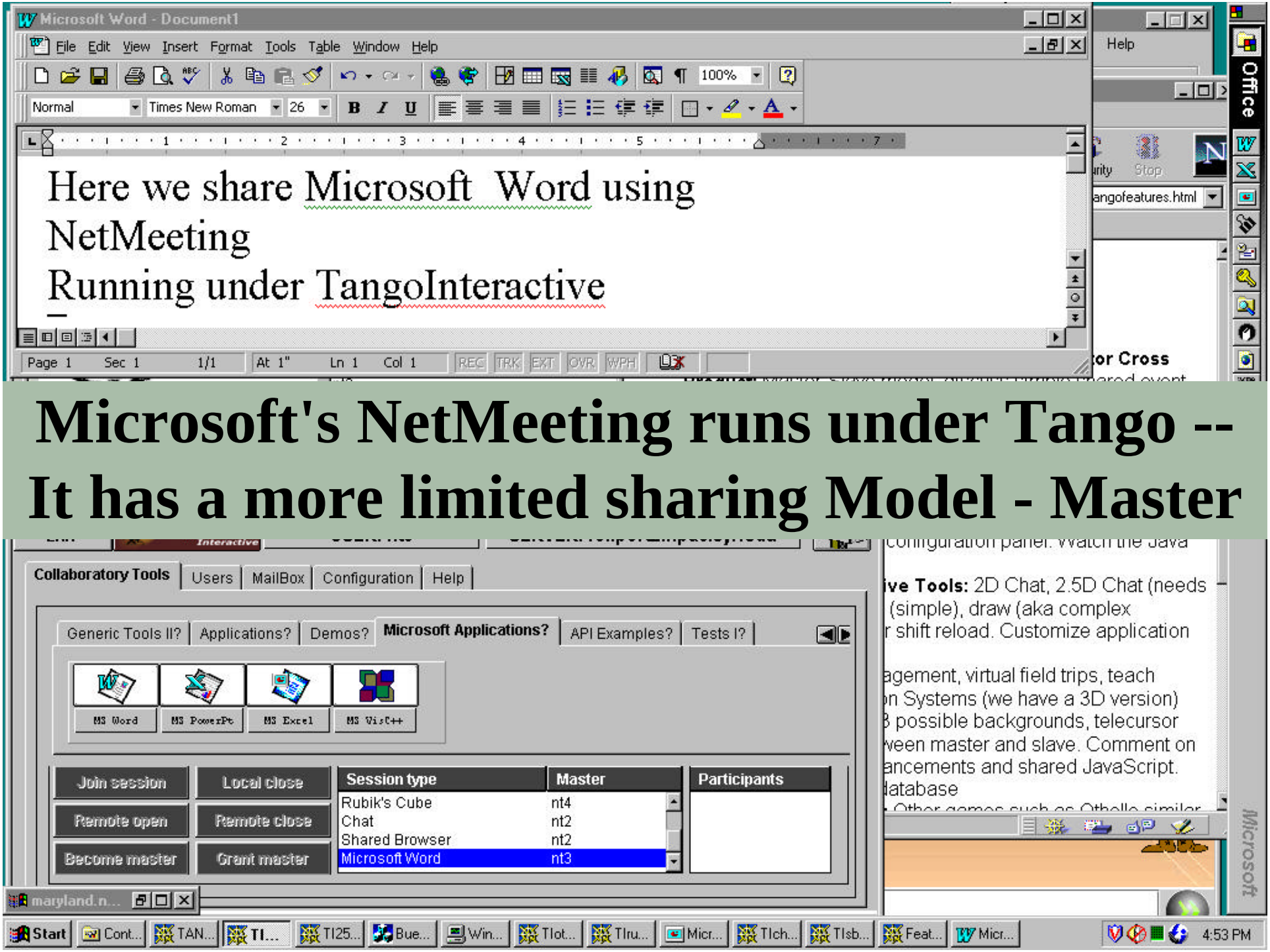
C++

Server Simulations

Web-linked Databases

CORBA

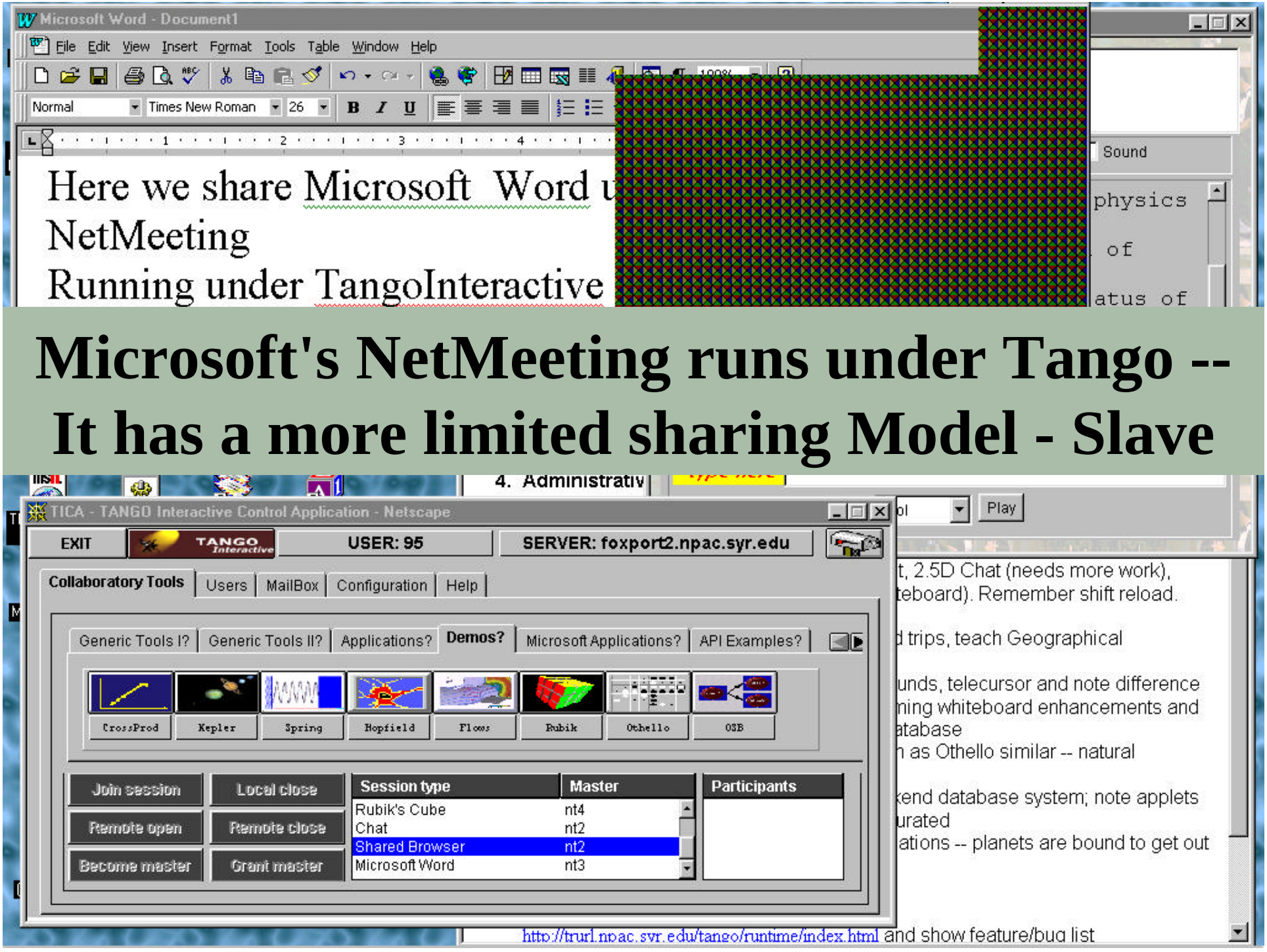
Lotus Notes ….



Microsoft's NetMeeting runs under Tango -- It has a more limited sharing Model - Master

Tango supports Microsoft NetMeeting

- Microsoft currently supplies NetMeeting for Windows 95/98/NT
- This supports a different model for sharing
  - When you share Word for example, there is only one copy of application running on the master
  - In Tango classic shared event model, the application (e.g. spring applet) runs separately on each machine
- At its simplest, NetMeeting shares the "display" (frame buffer produced by application)
  - This explains curious hatched area on following page. This corresponds to part of Word window that is obscured on the master but not on the slave.
- NetMeeting captures mouse and keyboard actions in the shared window and treats these as shared events
  - This allows shared editing with a difficult master-slave model
- This is an example of Tango interfacing to a C++ client application -- Microsoft's NetMeeting



Microsoft's NetMeeting runs under Tango -- It has a more limited sharing Model - Slave

Collaboration

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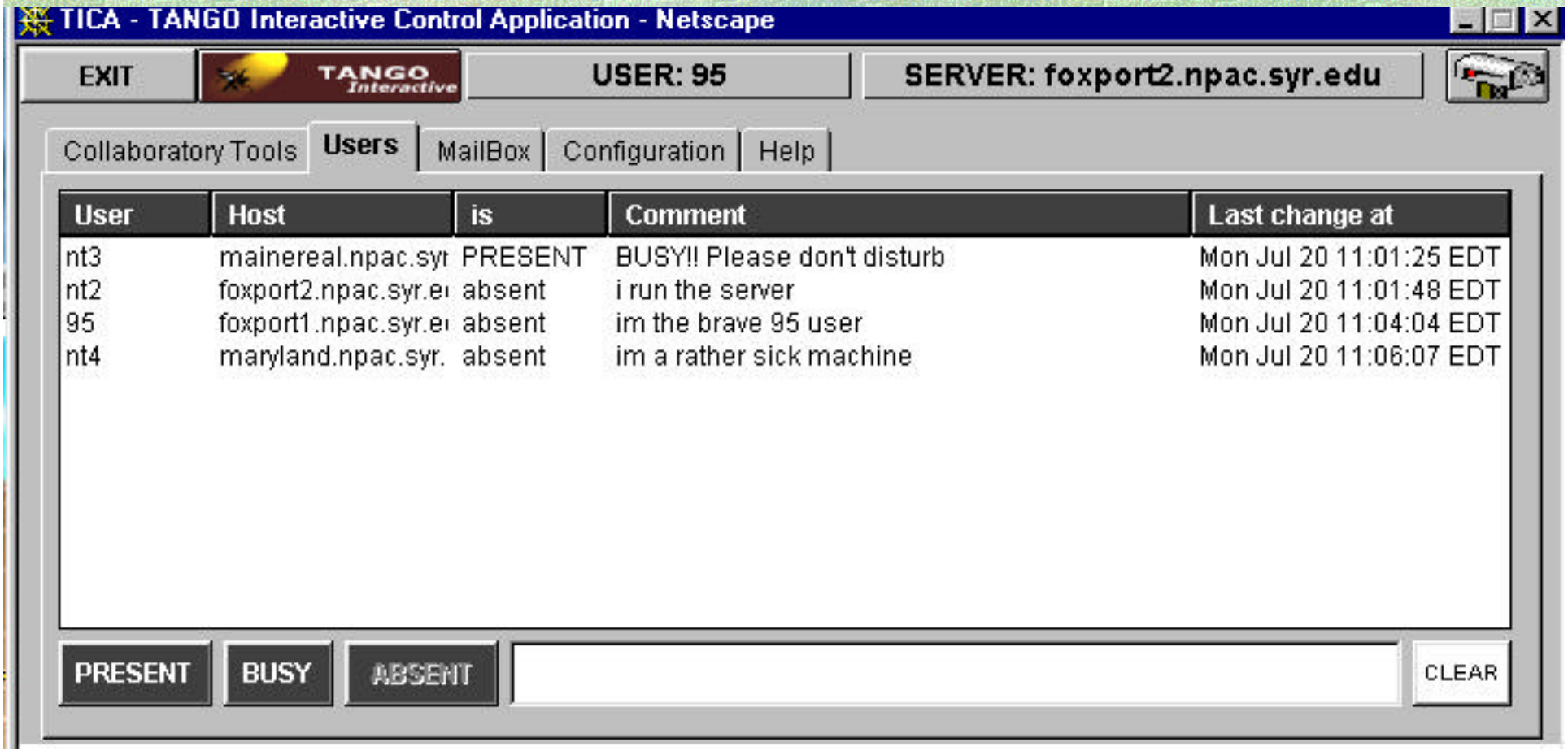
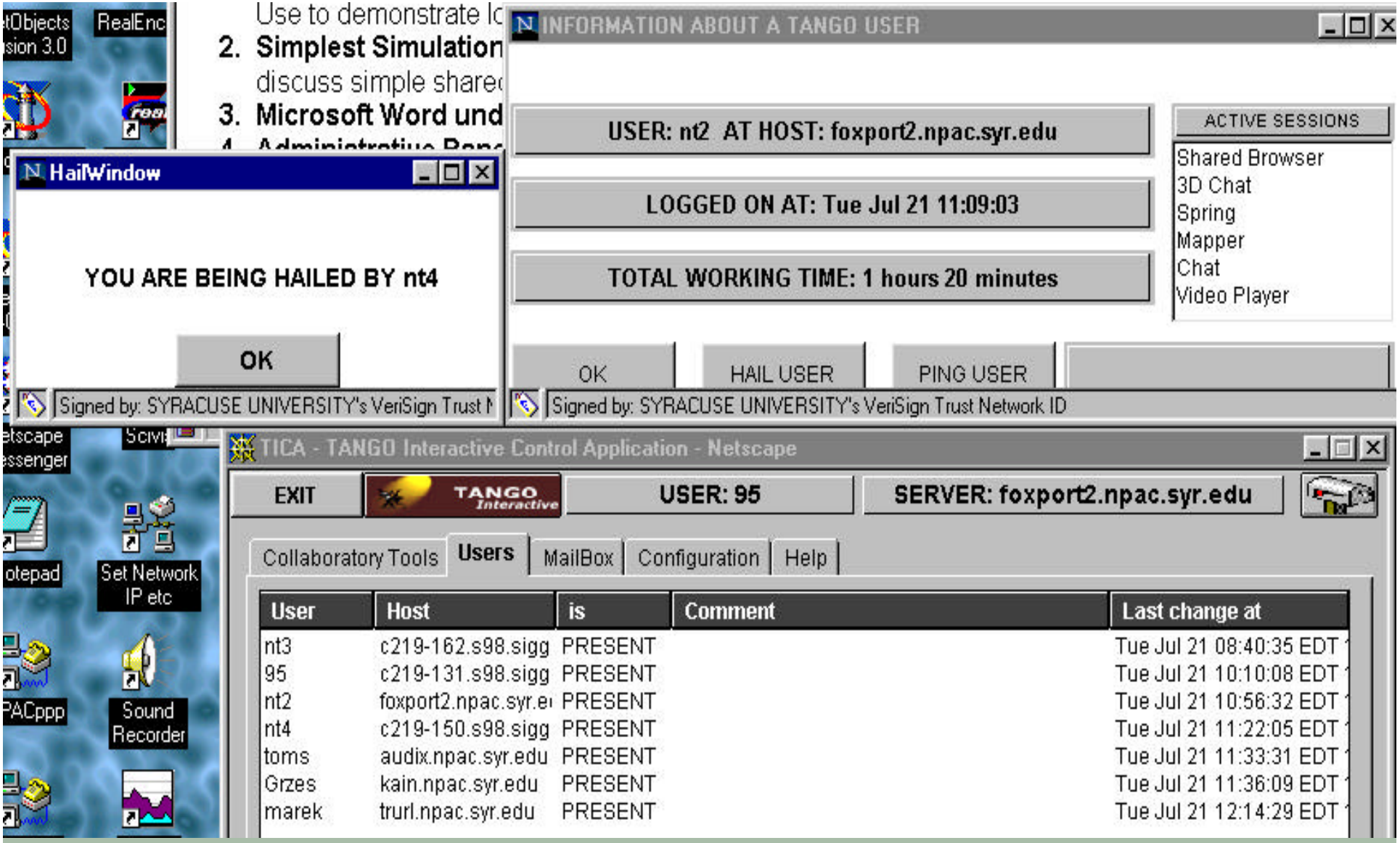
TANGO - Interactive

Control Applet has Administrative Tab with users and details about them



Users Information in Tango

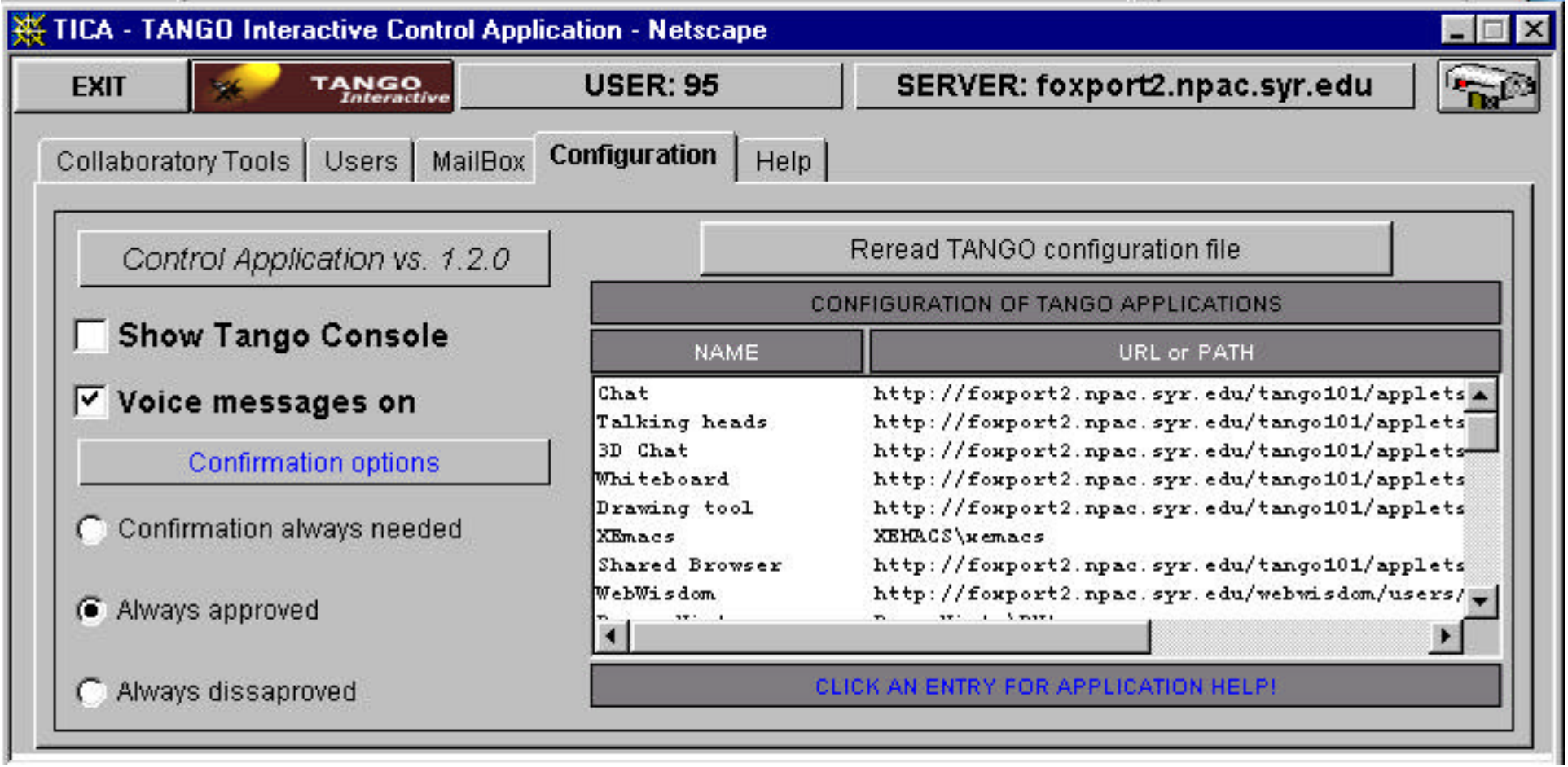
- There are other capabilities of Control Application with users, mailbox, configuration and help tabs
- The users tab can tell you more about all the users who are logged into the Tango Server
  - Their handle (login name), name of their client machine, status message, and time they last changed status
- Each user is responsible for setting status message
- On next page, we show the result of double clicking on a given user.
  - Up pops more information!
- You can ping the user -- send a message to see the user machine is still alive.
- If the ping works, try a hail which tries the wake the user up so he or she can collaborate with you.
  - Use a chat window to have a more detailed dialog with a hailed user



Wake Up a User! Find their sessions and work status

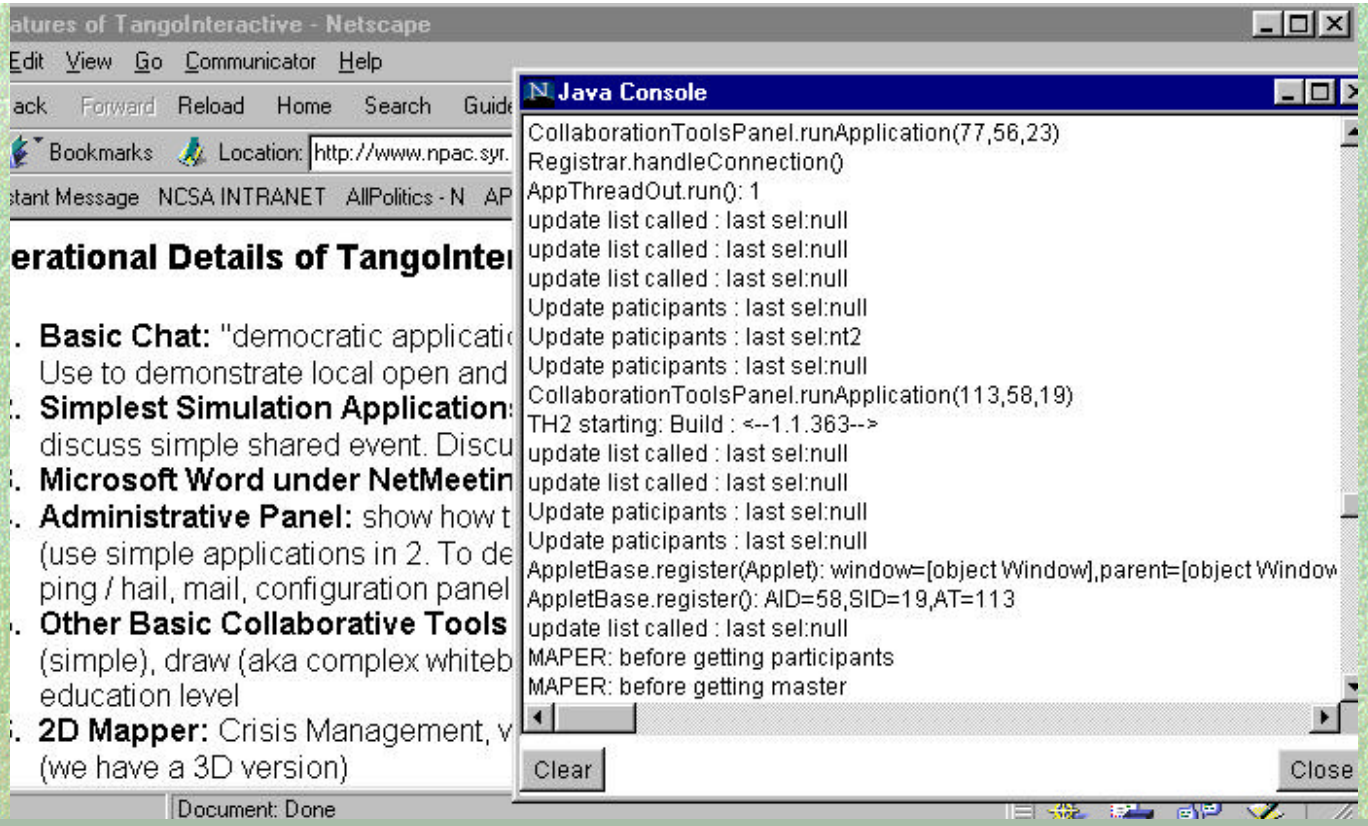
Sharing Your Web Application

Set Your Preferences in Configuration Tab

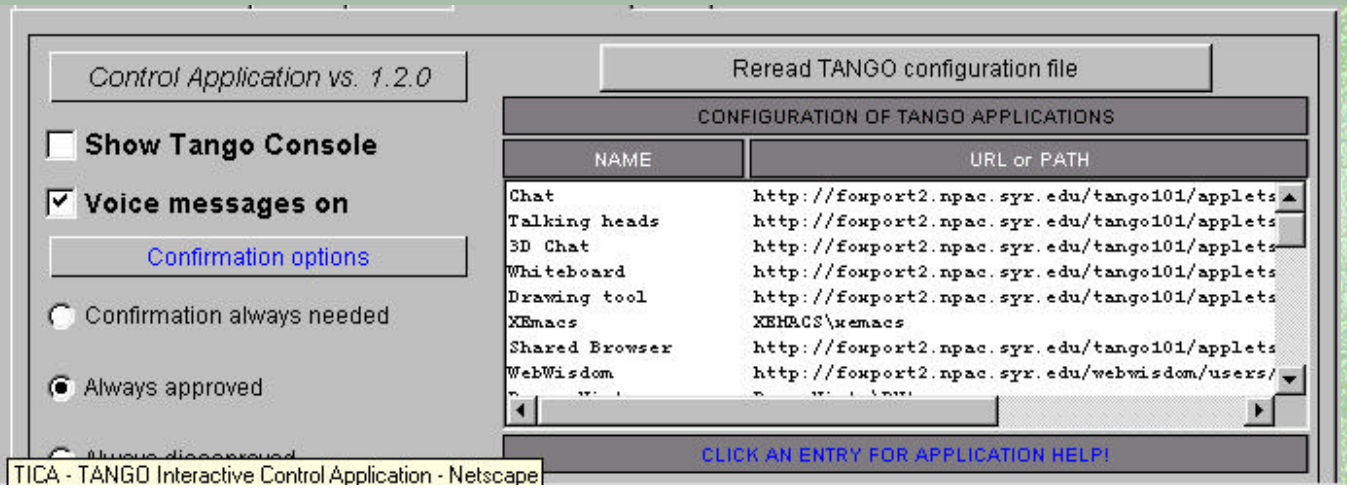


The Configuration Tab

- Clicking the configuration tab, we can inspect some useful system parameters
  - The Tango Console should be left unchecked by most users -- default
  - Voice messages are defaulted to on but this is pretty silly -- turn them off -- as generally they are just a distraction
- One can define the processing of remote requests -- change master status and remote open/close
  - always approved is default but you can choose always disapprove or that a confirmation box be displayed at each such request
- On the right, one has a configuration file window which is only useful if there is a problem -- it will tell you where the information for each application is stored.
  - Maybe some wizard can use this to a debug a problem



Use Java Console from Netscape to Debug



Don’t forget the Java Console!

- Although the Tango Console is not so useful, one can usefully invoke the Java Console from the communicator menu at the top of the Netscape window
- The Java Console can tell you if Netscape or Tango has made a mistake
  - Even if you can’t interpret it, copy and paste the console into your bug reports so the Tango team can diagnose problems
- Note you can start the Console at any time and still see past information and so you can wait till a problem develops

Collaboration

Web Pages

Web Pages

Java

Java

C++

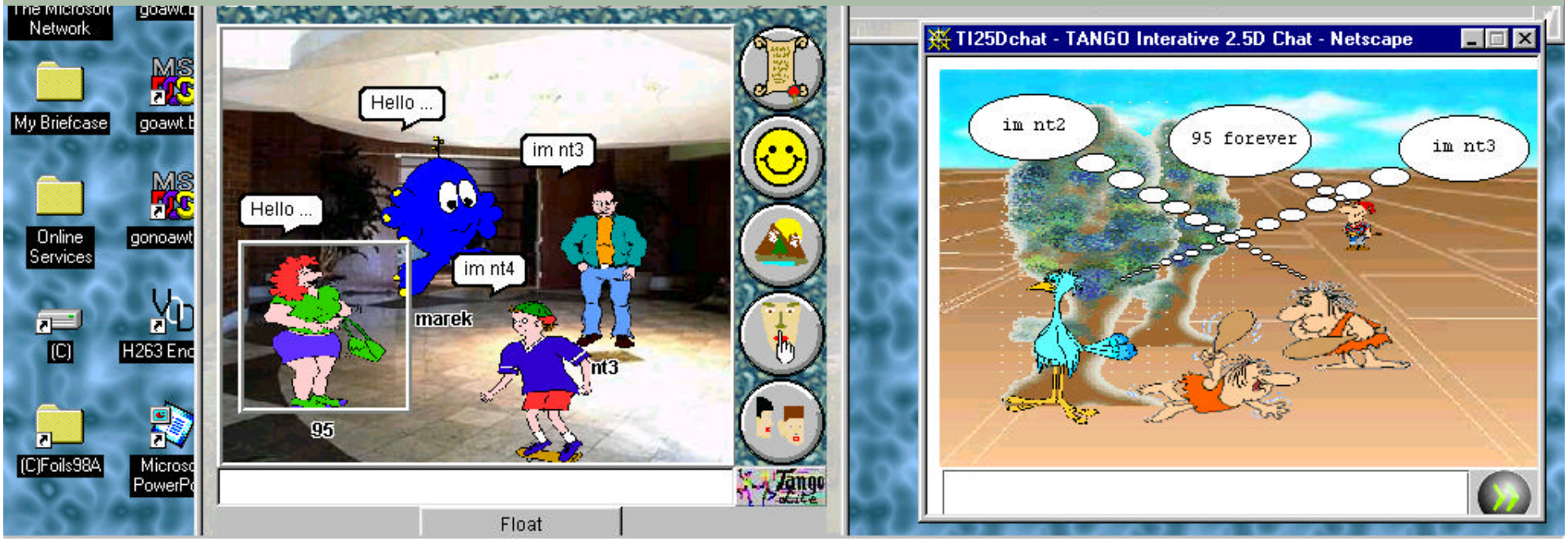
C++

TANGO - Interactive

Tango has many Applications

- **Tango has lots of applications ranging from the serious to the frivolous; from the essentially bug-free to cases which are only illustrative due to implementation problems.**
- **Tango has a well defined API which allows diverse applications to be ported to it.**
- **For instance, the current release of Tango sports three versions of chat.**
  - **Each of these can be invoked any number of times.**
  - **They have different tradeoffs from the serious dull text only version to the cool 2.5D graphical version which is cool (to a K-12 audience) but perhaps not the most efficient (to our busy executive)**

TangoInteractive is a flexible framework -- 3 chats



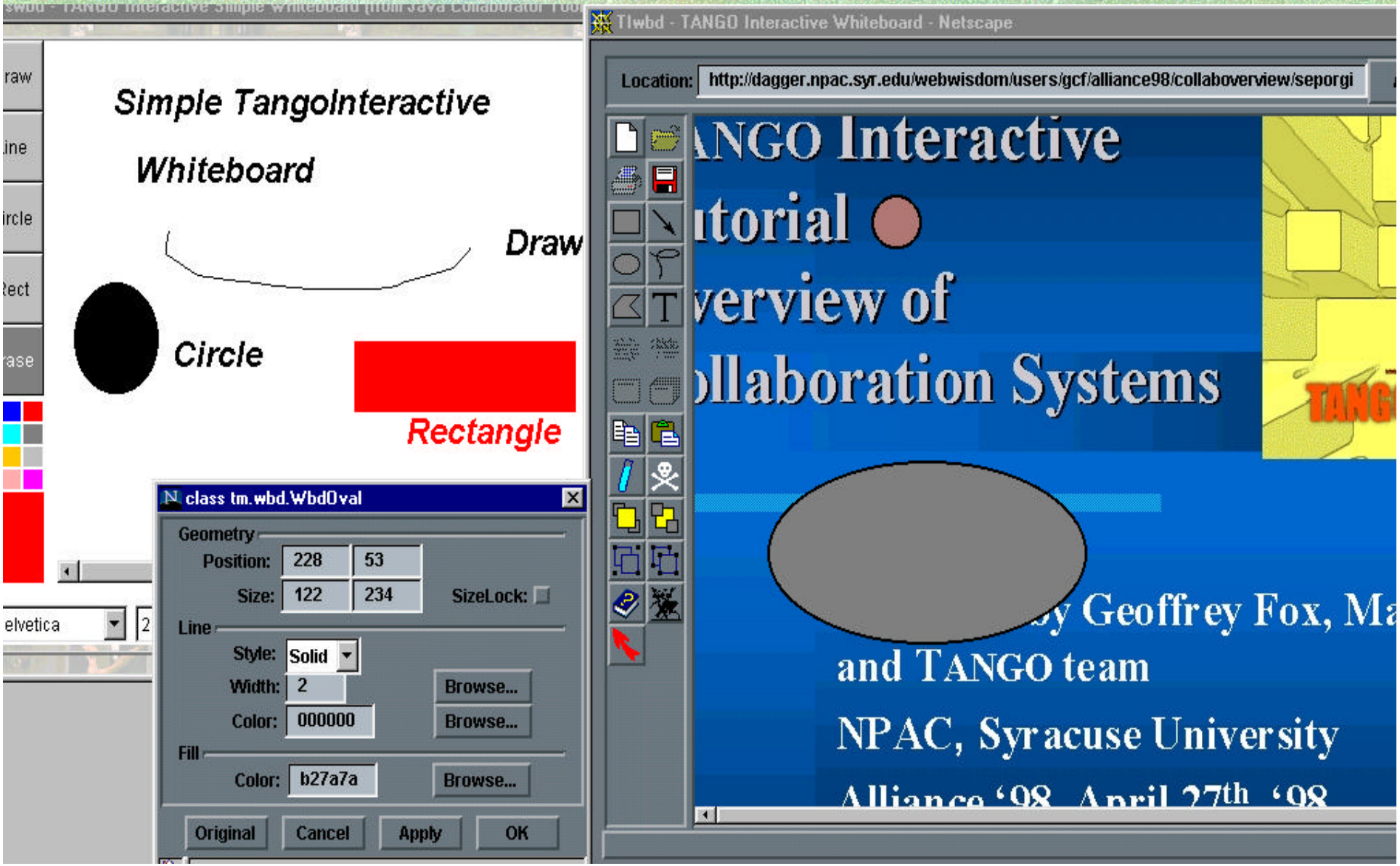
Multimedia Applications

- Tango has several multimedia applications
  - We have already seen the digital audio-video conferencing system Buena Vista
  - However we can also share audio and video files
- The multimedia applications only use the Tango Server for control information. The high volume data is sent by separate channels outside the Tango Server
  - This ensures that the Tango server is highly robust and scales well as number of users increases.
- The deployed version of Tango shares audio and video files using Java applets to decode multimedia data on the client (Video is low bandwidth H263)
  - Inside NPAC, we support a high end version with both MPEG and H263 codecs

Download The Built in Digital Audio Video with Tango Client

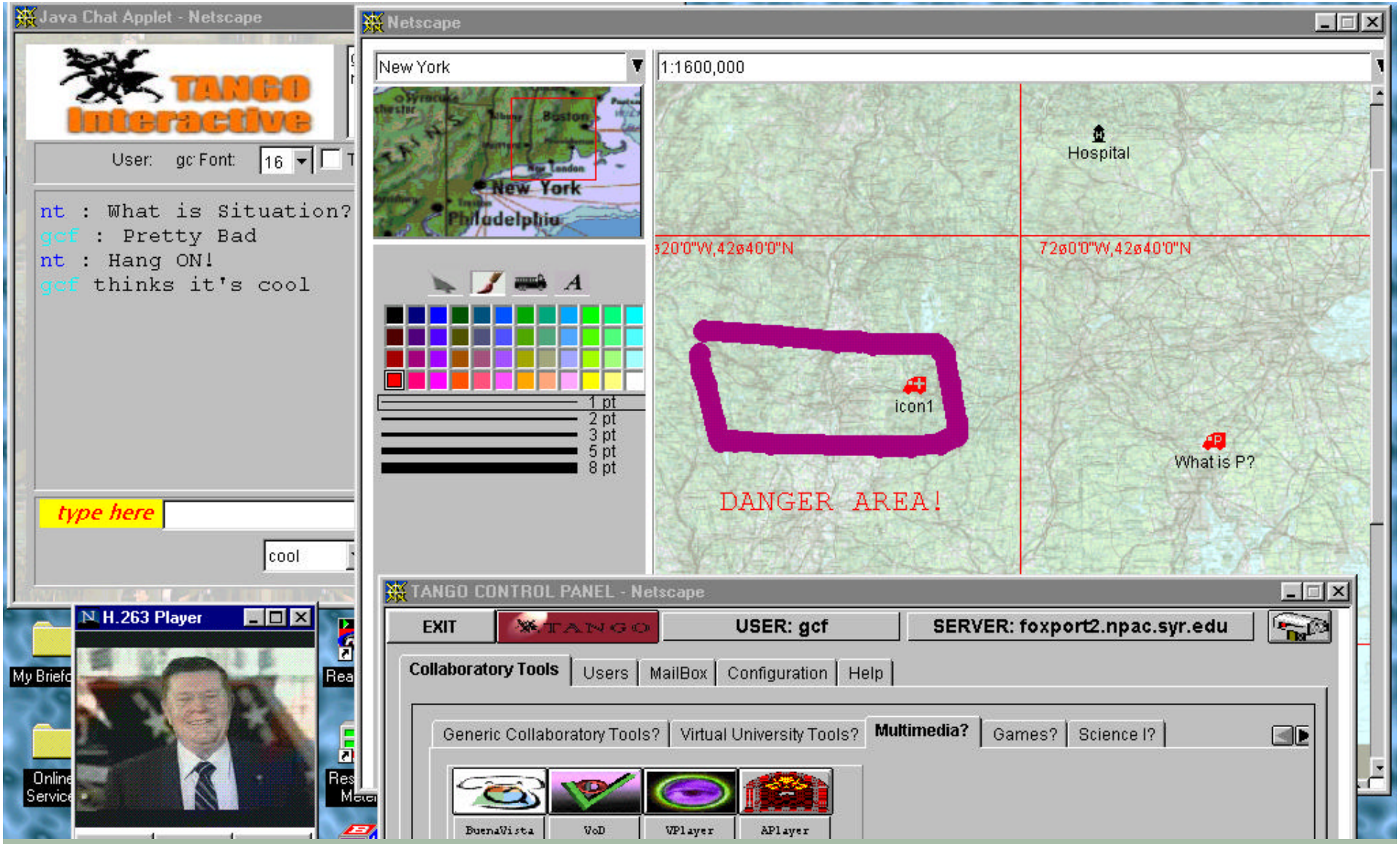
Tango Interactive Web Collaboratory Share Any Application around the world PC and UNIX Platforms

Tango Offers Two White Boards



There are many Whiteboards

- Tango offers two basic whiteboards
  - One has a simple intuitive interface but is not so powerful
  - The other is much powerful but is harder to use
  - This sophisticated whiteboard is also used as part of the WebWisdom shared curricula tool as one optional display mode
- The variety of such tools is a key advantage of a framework like Tango -- you can adopt it for your particular application and expect that the open API will allow a variety of basic tools such as whiteboards and chats to be developed to support your application
  - You are not locked into a particular generic support tool
- Another whiteboard is used in the popular mapper shared application where one has maps displayed on the whiteboard
  - Pan through the maps with interface at top left
  - Add shared icons, text and freehand drawing



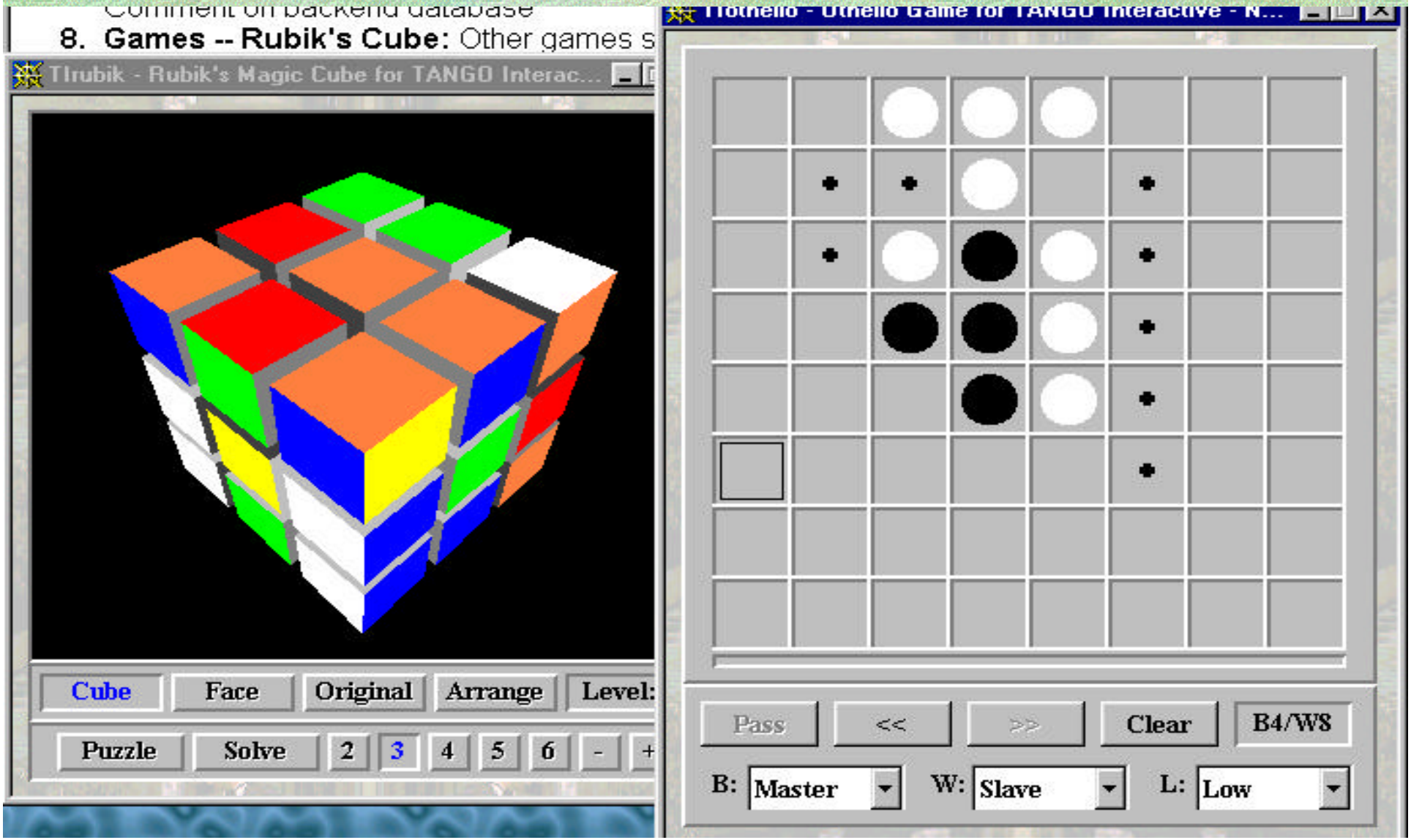
A Shared Java Mapper used in Crisis Management

You Choose what to share in Tango

- These whiteboards illustrate your freedom in defining shared events in Tango
- For each of the three examples just discussed (basic whiteboards and mapper), all users in the session can freely modify the whiteboard
  - For the mapper for instance anybody can add icons (and everybody sees them) and anybody can change the viewpoint (controlled by graph on top left)
- We could have made a different choice, with for instance only the master able to set the viewpoint.
  - Each event can be treated differently -- all could set icons with master only setting viewpoint and text
  - these choices can also be dynamically changed
- This illustrates power of shared event model as one can choose which events to share and change this at any time
- It is all "just software"!

Sharing Your Web Application

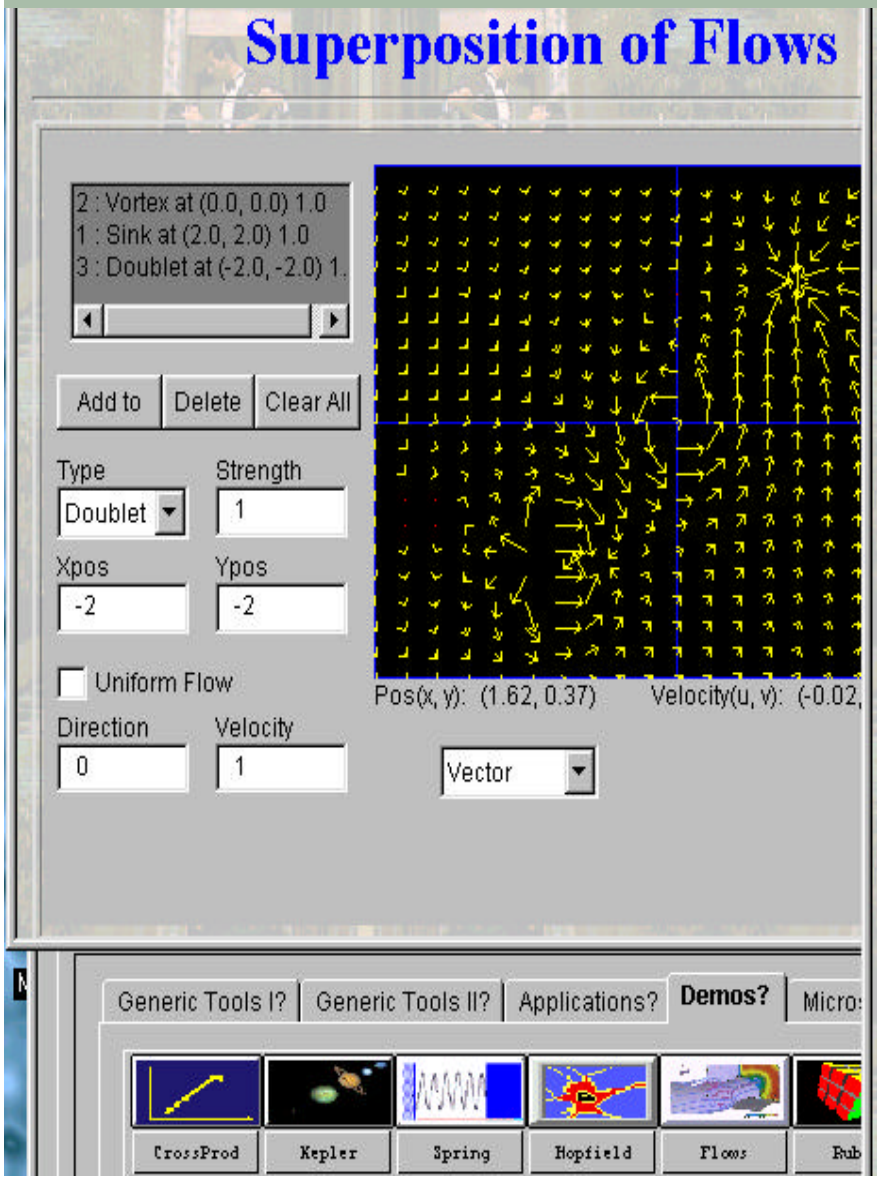
Games are Natural in Tango
Othello and the Magic Cube

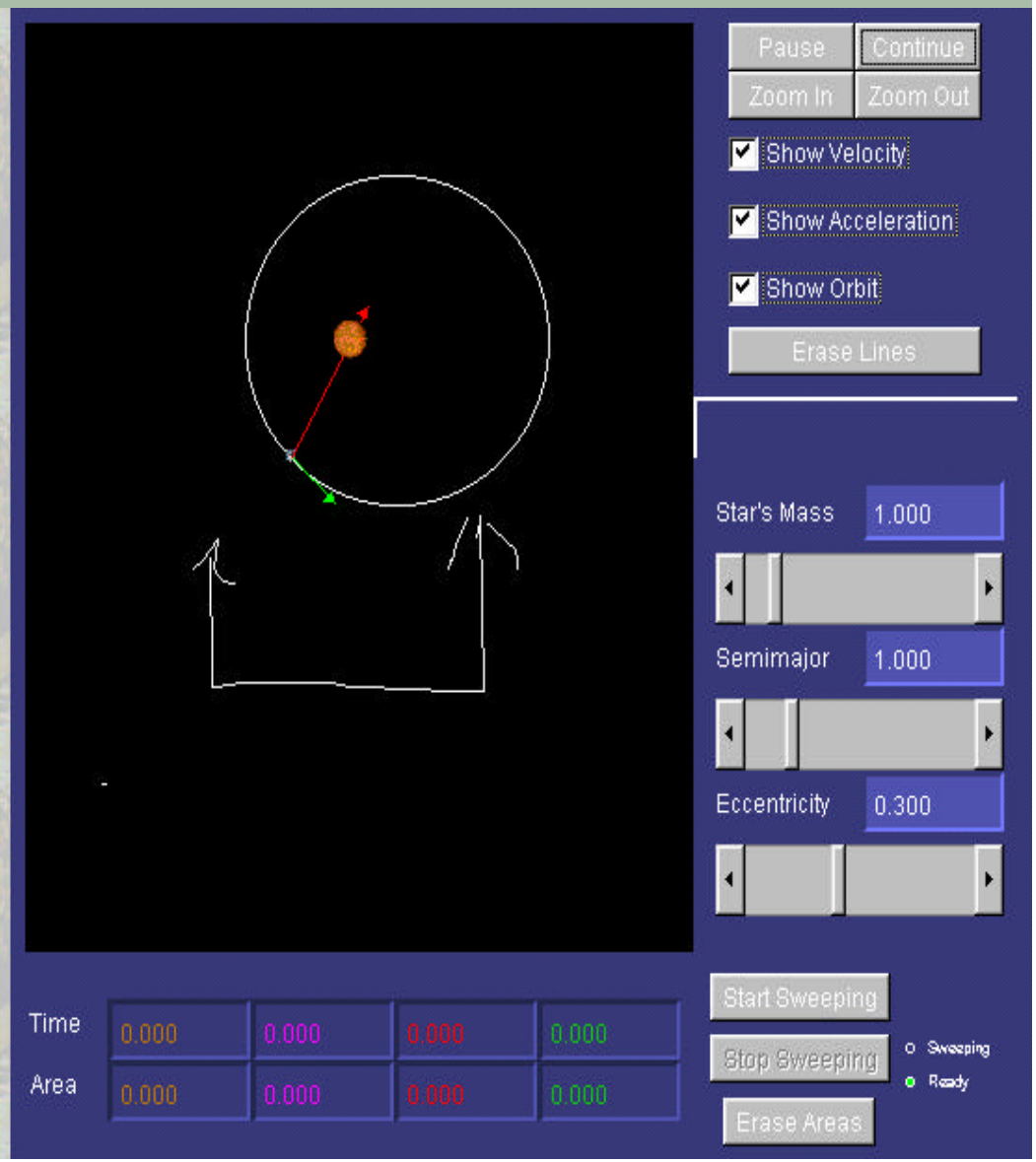


More Applications: Games and Physics

- So games are a natural applications of collaborative system
  - Othello is an interesting and serious 2 player game where you can also play as an individual against the computer
  - The magic cube can use use the the ability of transferring master status to allow a slave(observer) take control and solve the puzzle started by the original master
- We showed two simple physics applications but we also have more sophisticated shared applets illustrating planetary motion and computational fluid dynamics (CFD)
  - CFD just shares data and display options and solves the equations (written in Java) fully on each machine
  - Planetary motion will start and stop the planets motion and then resume the simulation

Shared Simulations -- Fluid Flow and Planetary Motion





TangoInteractive can share

Client Java Applets

JavaScript

Java Applications

C++

Server Simulations

Web-linked Databases

CORBA

Lotus Notes ….