Dartmouth Workshop

on

Transportable Agents

September 28, 1996
Dartmouth College
Hanover, New Hampshire

Acknowledgments

Cosponsored by the
Office of Naval Research

and the
Air Force Office of Scientific Research

in cooperation with the
Dartmouth Institute for Advanced Graduate Studies (DAGS)

Saturday, September 28
Morning sessions

8:00 - 9:00 A.M.	**Continental breakfast** **(provided)**
9:00 - 10:00 A.M.	**Session 1: *Why transportable agents?*** **Bob Gray (Dartmouth)**
10:15 - 11:15 A.M.	**Session 2: *Planning and scheduling*** **Kris Hammond (University of Chicago)**
11:30 - 12:30 A.M.	**Session 3: *Fault Tolerance*** **Dag Johansen, Fred Schneider and Robbert Van Renesse (University of Tromsø and Cornell)**
12:30 - 1:30 P.M.	**Lunch buffet** **(provided)**

Saturday, September 28
Afternoon Sessions

1:30 - 2:30 P.M.	**Session 4: *Security*** **Robert Morris, Sr. (consultant)**
2:45 - 3:45 P.M.	**Session 5: *Navigation*** **James White (General Magic, Inc.)**
4:00 - 5:00 P.M.	**Session 6: *Demos and WIP's***
5:15 - 7:00 P.M.	**Dinner** **(on your own)**
7:00 - 10:00 P.M.	**Reception and**
8:00 - 9:00 P.M.	**Session 7:** ***Panel on languages and communication*** **Moderator:** **Bob Sproull (Sun Microsystems)**

Sunday, September 29
Morning demos

9:00 A.M. - Noon

Session 8: *Open demos*

Anyone who is still in town is invited to demo their software (and see the demos of others).

Location: <u>Sudikoff</u>

Format

- **20 minute overview**
- **40 - 50 minute discussion**

So what are these agent things anyway?

Bob Gray
Department of Computer Science
Dartmouth College

Acknowledgments

The Three Professors

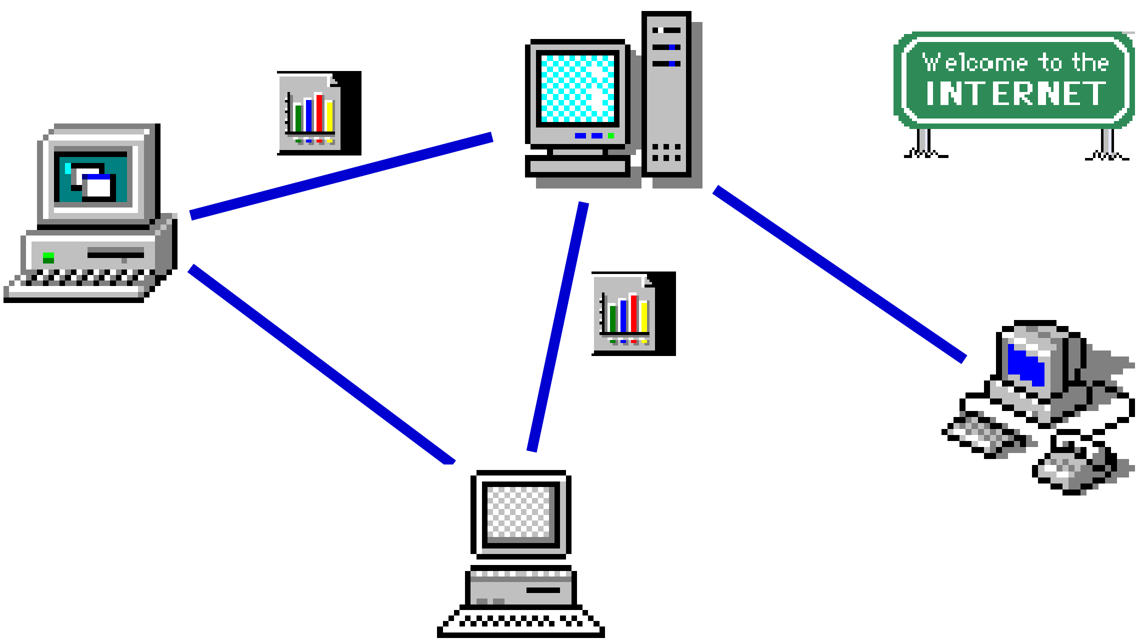
George Cybenko	David Kotz	Daniela Rus

The Graduate Students

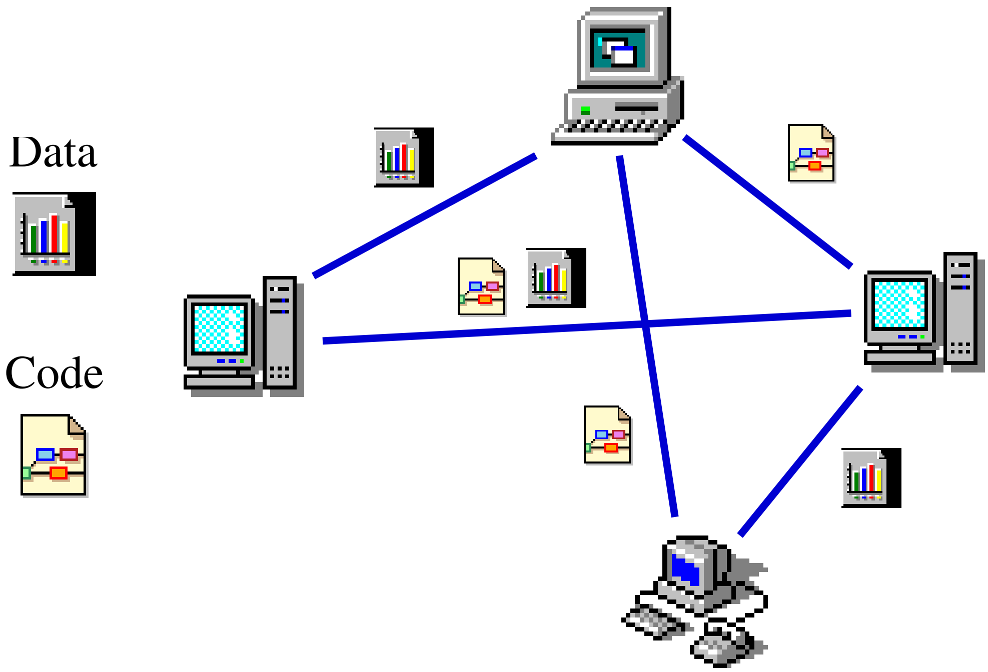
Aditya Bhasin	Katya Pelekhov	Hiro Moizumi
Ting Cai	Saurab Nog	Keith Kotay
Sumit Chawla	Fred Henle	Melissa Hirschl

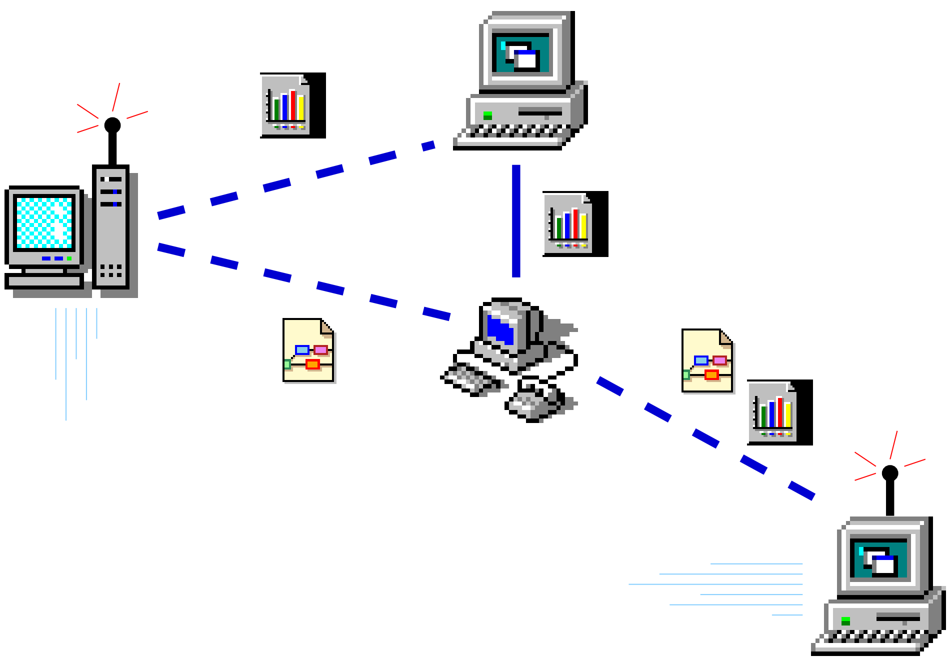
And many other students ...

Where have networks been?

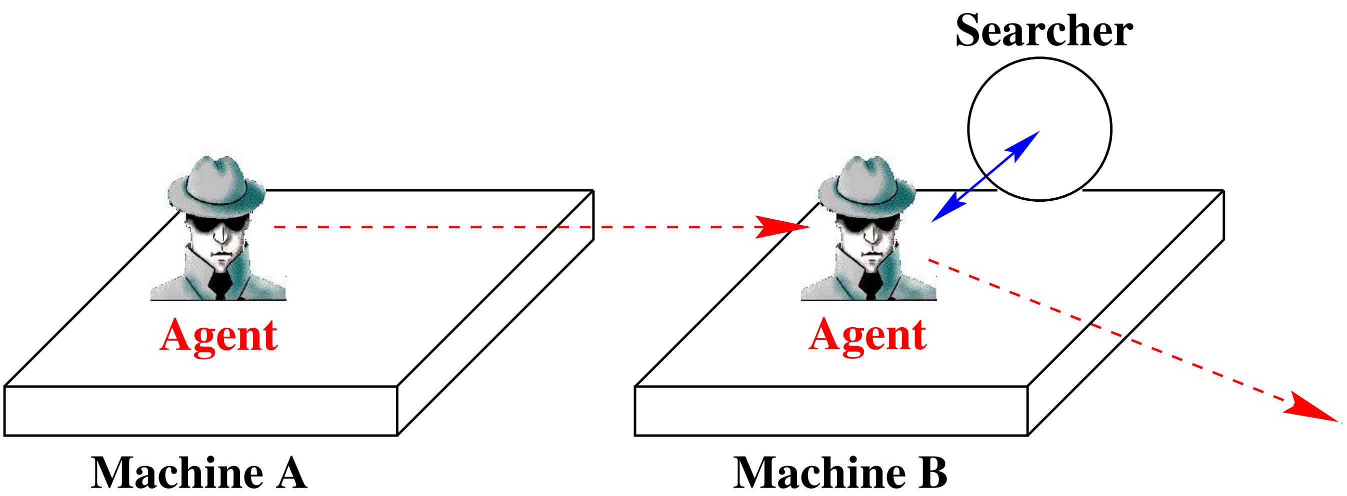


Where are networks going?





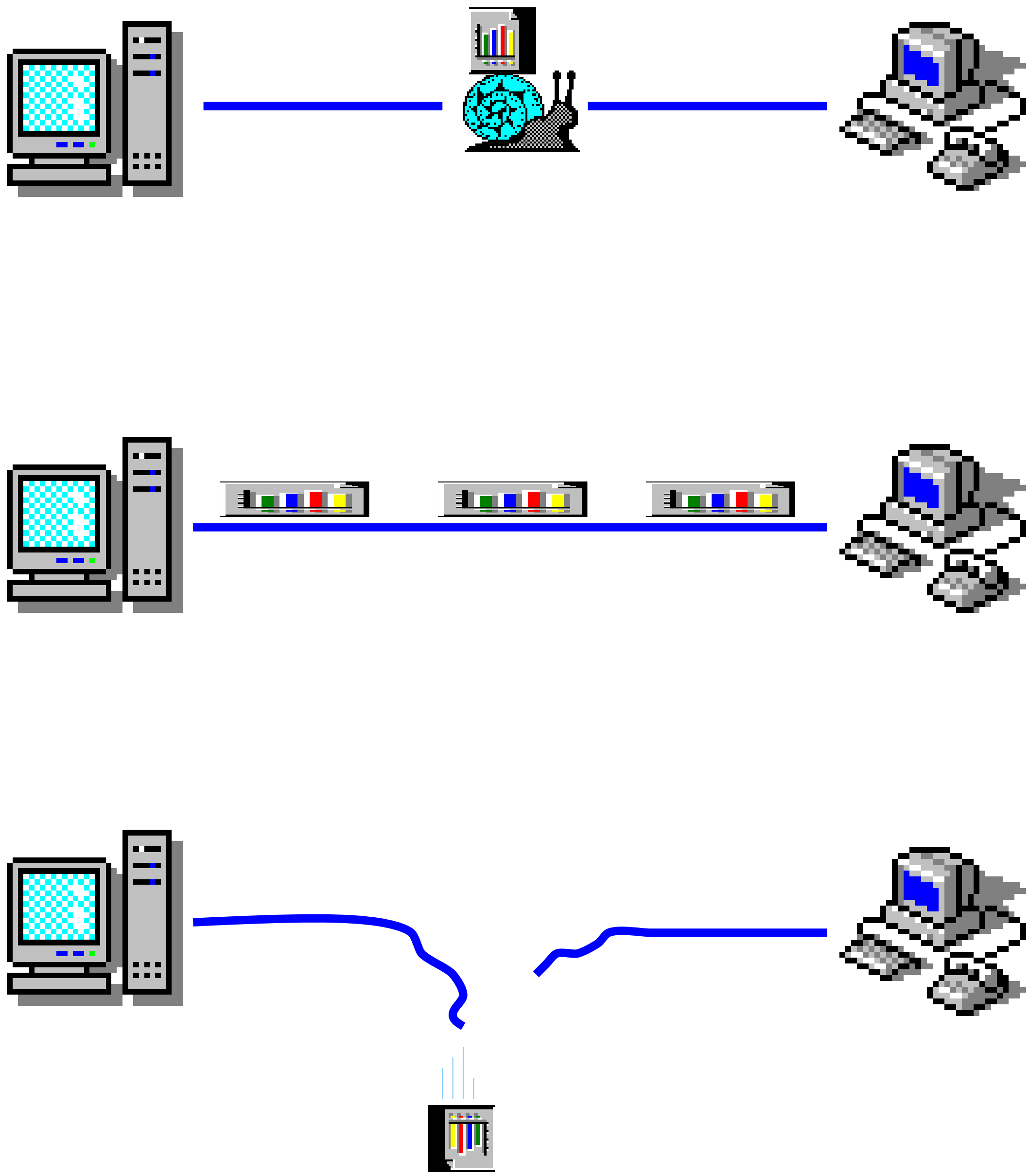
What is a transportable agent?



- Executing program
- Migrates **by choice**
- Interacts
- Heterogeneous systems

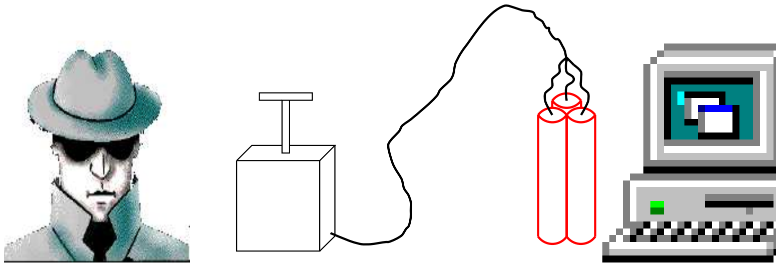
Advantage: Moving code!

- Minimize the use of a low-quality connection

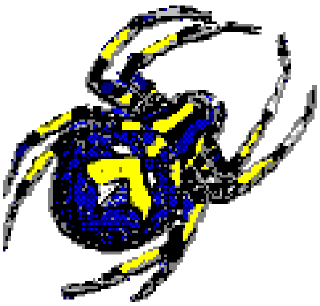


Disadvantage: *Moving* code?!

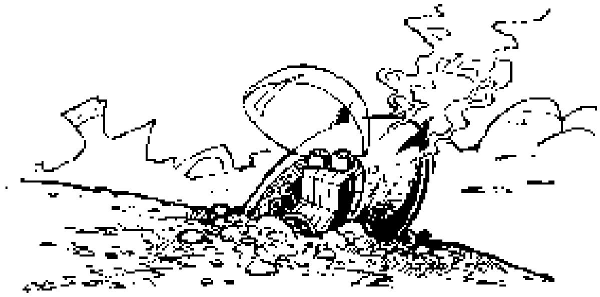
- **Security**



- **Debugging**



- **Fault tolerance**



What are the applications?

- Workflow
- Mobile computing
- Information retrieval
- Network and platform management
- Distributed simulation
- GUI's

What services are required?

- **Base services**

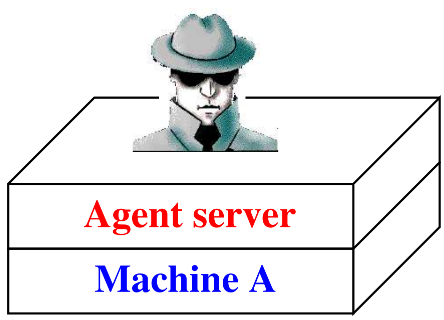
  Migration, communication and status

- **Security**
- **Fault tolerance**
- **Resource discovery**
- **Scheduling and planning**
- **Navigation and tracking**
- **Billing**

History

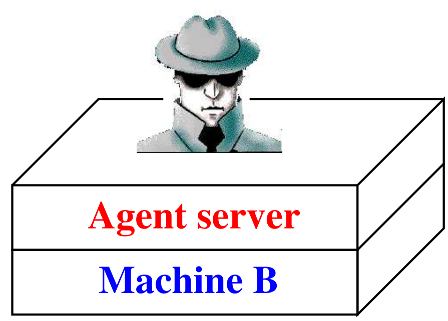
1984	Remote Procedure Call (RPC)
1987	Network Command Language (NCL)
1990	Remove evaluation (REV)
1994	SUPRA-RPC
1994	Telescript
1994 -	Agent Tcl ARA FTP CyberAgents IBM Aglets ECRC Mobile Service Agents Sodabot Tacoma WAVE ...

A "typical" system



1. Agent executes
2. Decides to migrate
3. Collects state information
4. Contacts remote server

5. Transmits code/state



6. Server receives code/state
7. Authenticates agent
8. Sets up secure environment
9. Restores agent
10. Starts agent

Distinctions and trends

Commercial	vs.	Research
Imperative Tcl Java Telescript	vs.	Declarative
GO	vs.	"Briefcase"
Interpreted	vs.	Software Fault Isolation (SFI)
Stand-alone	vs.	Tight Web integration