

*Jane: An Architecture for
Interactive Parallel Simulations*

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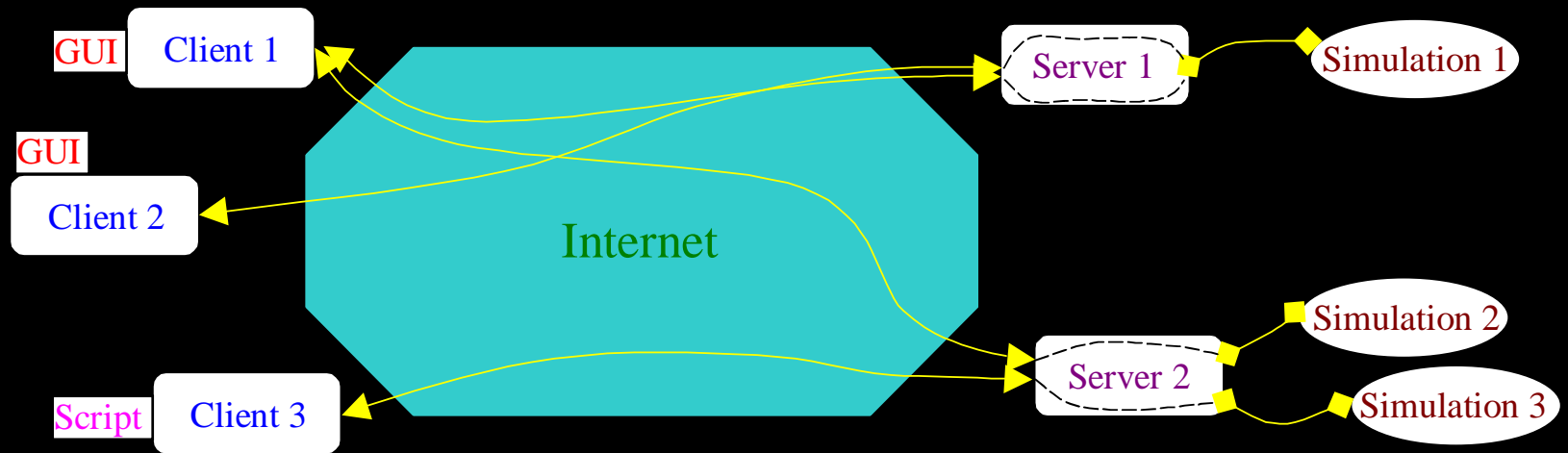
WEBSIM '99

Jan 19, 1999

What is Jane?

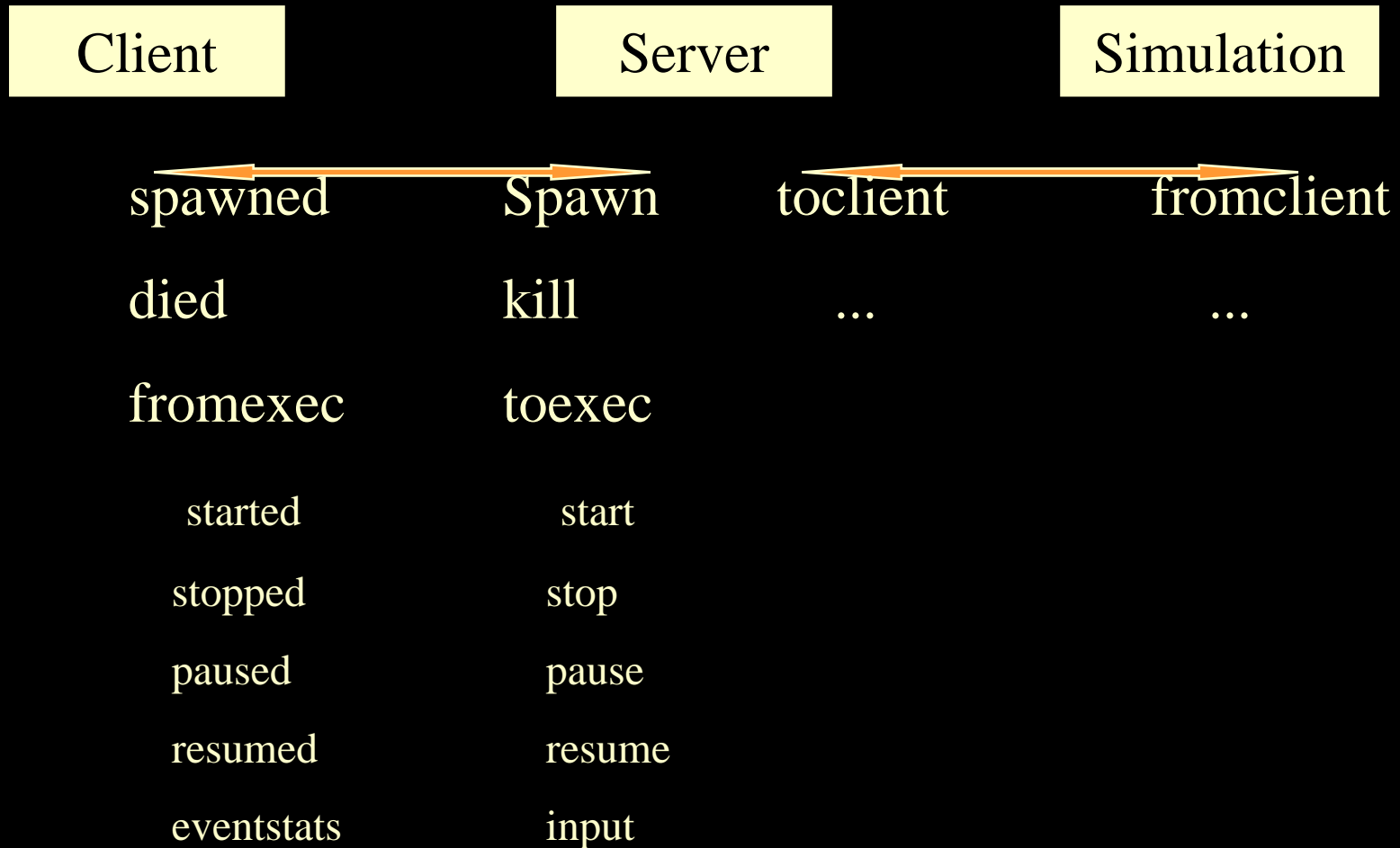
- A framework for interactive parallel simulations
- Began as part of on-going DARPA/NSF network simulation projects
 - TeD language & models
- About 2 years into development
- Actively being used by network modelers, and RTI-Kit users

Jane Client-Server Architecture



- Remote interaction over the Internet via laptops
- Graphical interfaces display & control
 - Default views and controls, user-extendable
- Collaborative interaction
- Scripting
- Simulation gateway to larger design/decision tools
- Pre- & post-simulation analysis
- Plug-N-Play interface to different simulators

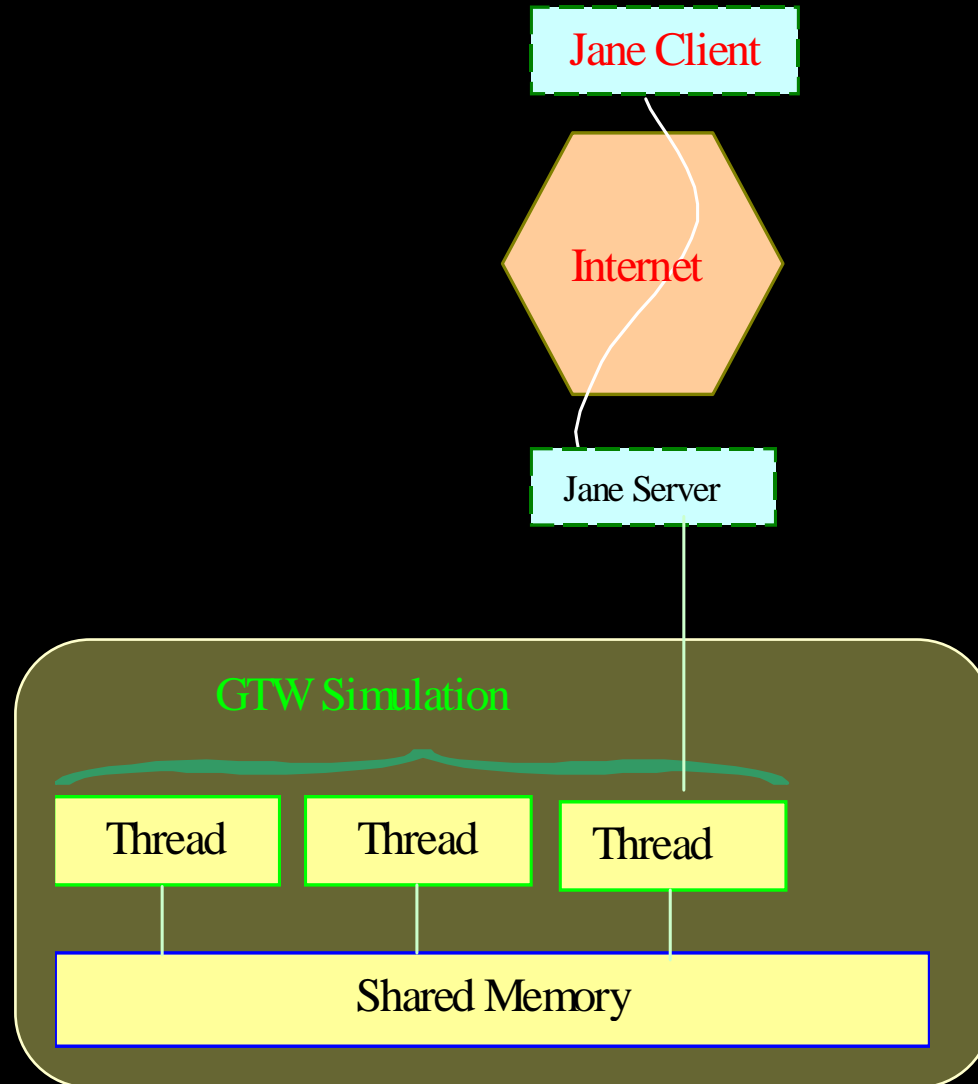
Client-Server-Simulation Protocol



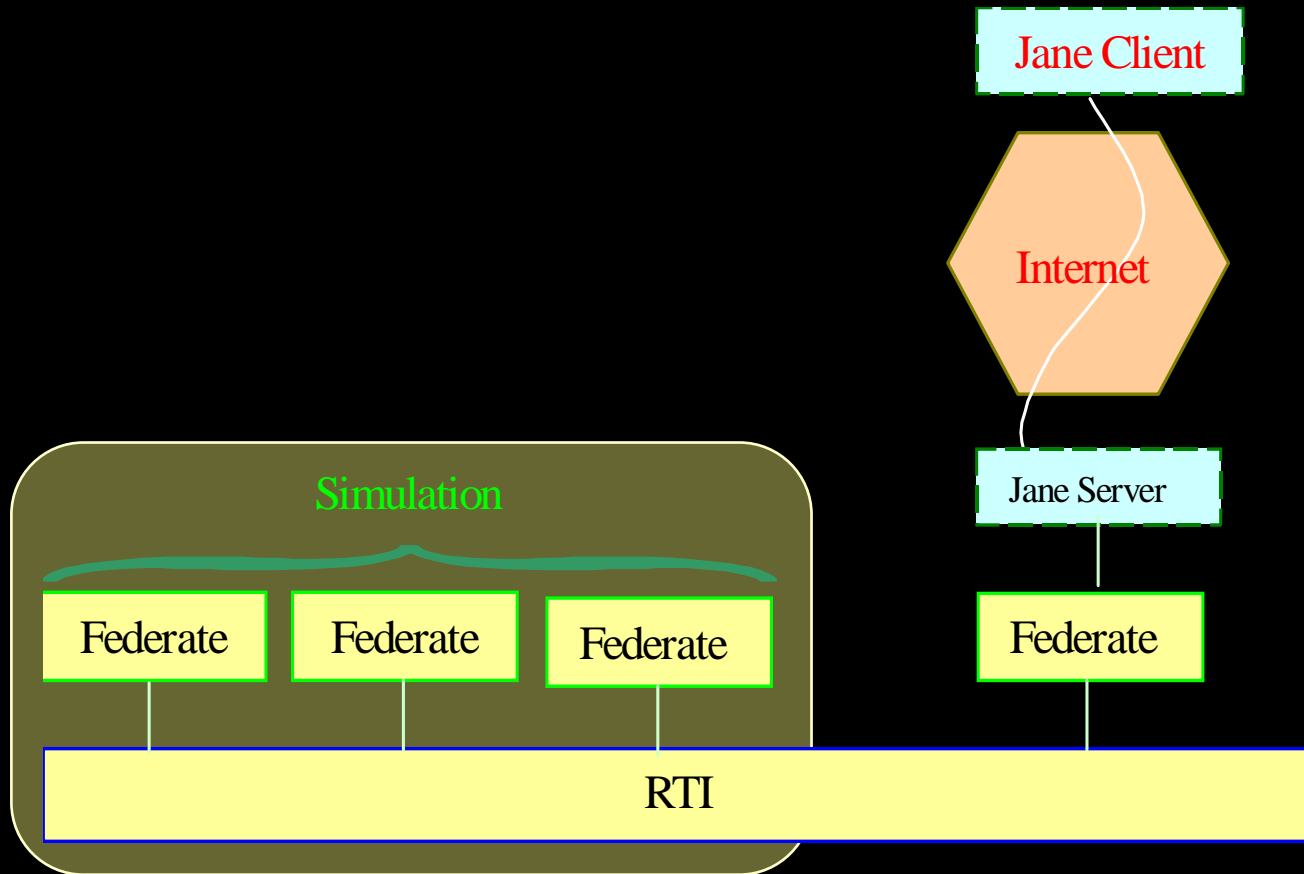
Software Components

- Server written in C
 - tested on Sparc & SGI
- Client written in Java
 - tested on Sparc, SGI, Windows
- Simulators
 - GTW, GTW++, TeD
 - RTIs based on Georgia Tech RTI-Kit
- Model instrumentation API in C/C++
 - at the simulation
- Model view extension API
 - at the client

Jane with Georgia Tech Time Warp (GTW)



Jane with RTI



Sample Jane Session

The screenshot displays the 'Jane Session 1' application window. The menu bar includes 'Session', 'Edit', 'Server', 'Simulation', and 'View'. The 'Simulation' menu is open, showing options: 'Start...', 'Stop', 'Pause', 'Resume', and 'Kill'. The 'Resume' option is highlighted. The main text area shows the following log output:

```
Main  
Initialised Heap.  
My PE (1) initialised after:  
Initialised Heap.  
My PE (0) initialised after:  
Initialised Heap.  
My PE (3) initialised after:  
Initialised Heap.  
My PE (2) initialised after spawning...  
Paused at GVT = 103795  
PAUSED> RUNNING> Paused at GVT = 629228  
PAUSED>
```

Below the log is a 'Send' button with the text 'help' in red. The 'Progress' section shows 'Connected to nighthawk.cc.gat' and 'Simulation is paused.' A progress bar for 'TIME' is at 62% with the range '629228.0 -> 1000000.0 ...'. Below this is a 'Total Events' graph with a yellow area chart. The y-axis ranges from 0.0 to 1,600,000.0. The x-axis ranges from 0.0 to 100.0. A legend at the bottom of the graph identifies four categories: 'Processed' (black line), 'Committed' (red line), 'Rolledback' (green line), and 'Aborted' (purple line). The 'Processed' and 'Committed' lines are nearly identical and rise sharply to about 1,000,000.0 within the first 10% of the simulation. The 'Rolledback' and 'Aborted' lines remain very close to the x-axis. The 'Identification' section shows a dropdown menu with 'Kalyan Perumalla' selected. The 'Chat Area' is empty.

Sample Collaborative Session

The screenshot shows a software window titled "Jane Session 1" with a menu bar containing "Session", "Edit", "Server", "Simulation", and "View". The main text area displays the following commands and status:

```
pestats [<pe#>]
lpinfo [<lp#>]
lpstats [<lp#>]
* <lp#> ...
pollfreq [<integer>]
feedbackfreq [<integer>]
RUNNING> Paused at GVT = 300898
PAUSED>
```

Below the text area is a "Send" button and a text input field containing "lpstats".

The "Progress" section shows a status bar with "Connected to nighthawk.cc.gatech.edu" and "Simulation is paused." Below this is a GVT progress bar from 269097.0 to 1000000.0, currently at 26%. A "Total Events" graph shows a yellow bar representing the total number of events over time, with a legend for "Processed", "Committed", "Rolledback", and "Aborted".

The "Identification" section lists participants: "Kalyan Perumalla", "1: Rob Morgan", "2: Richard Fujimoto", and "1: Rob Morgan". A tooltip "Other participants" is visible over the second "1: Rob Morgan" entry.

The "Chat Area" contains the following messages:

```
<KP> Hi there!
<RF> Hi, I'm starting the simulation.
```

Sample User-defined View

TeD Entity & Resource Hierarchy

File Tree Table

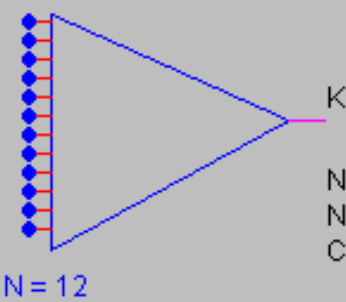
Created 12 entities.

Selected Node :

Entity Name: src[4] Entity Type: BurstySource Architecture Type: OnOffSource

Category	Name	Type	Value
DConst	EmissionTime	double	1.0
DConst	Seed	int	7634
DConst	P_on	double	0.6
DConst	P_off	double	0.8

Model Animation



N = 12

K

N Sent = 20445
N Lost = 129
CLR = 0.0062700495771

Issues Addressed

- Default views and controls
 - simulation control, performance plots, ...
- Collaboration
 - among modelers, simulation experts, ...
- Security
 - CPU hogging, undesirable execution, ...
- Simulation--visualization synchronization
 - time management -- optimistic/conservative
- Semi-transparent instrumentation

Status

- Graphical environment *readily usable* by GTW, TeD and RTI-kit users
- Parallel simulations can be accessed over the Internet via laptops
- Users can collaborate to control and view the same simulation
- Easy to integrate other simulators into this framework
- Freely available for research use

Ongoing & Future Work

- Debugging and monitoring
- *On-line* critical path analysis
- Enhanced security and speed
- Multiple scenario analysis support (cloning)

FOR MORE INFO...

TeD *home page* www.cc.gatech.edu/computing/pads/ted.html

Jane *home page* www.cc.gatech.edu/computing/pads/jane.html