



The General Variables Concept: A Simple Step from Single- to Multi-user Environment

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Talk outline

- Motivation for General Variables (GV)
- Characteristics
- Implementation and experience
- Future work

Motivation for GV

- Multi-user virtual environments
 - Entertainment (social interaction, games)
 - Distant learning
 - Cooperation

Common and repeating tasks

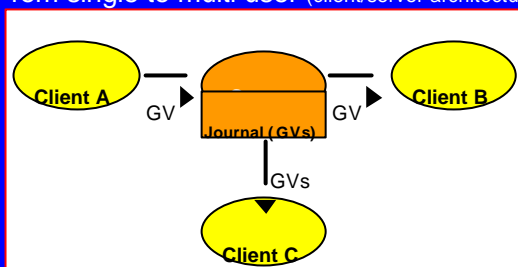
- Distribution of shared state changes
 - Environment (doors, lights)
 - Avatars (positions, gestures)
 - Application specific (special modes)
- Latecomers updates
- Exclusive access (locks)
- User management



General Variables concept

GV: Main principle

From single to multi-user (client/server architecture)



GV structure

name	Unique identification
commands	List of [command, value] pairs
command, value	<u>cmd</u> : setValue, insertValue, clear, ...
value	arbitrary structure
flags	Additional properties of the variable
echo	T F
storage	None Temporary Persistent
distribution	All Subset

Examples of GVs

1) A user edits a colour in a table

GV:(name:table3.color; commands:{setValue(r,g,b)}; flags:(echo:F; storage:persistent; distribution:{All}))

2) A user changes his/her position

GV:(name:av1.pos; commands:{setValue(x,y,z)}; flags:(echo:F; storage:temporary; distribution:{All}))

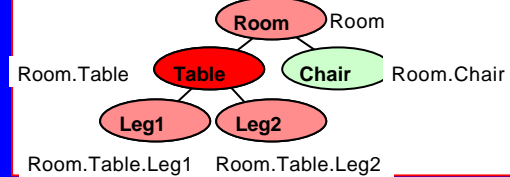
3) A user opens a door

GV:(name:door8; commands:{setValue("open")}; flags:(echo:T; storage:persistent; distribution:{All}))

Exclusive access - Locks

- Cooperative editing
- Hierarchical locking based on variable names

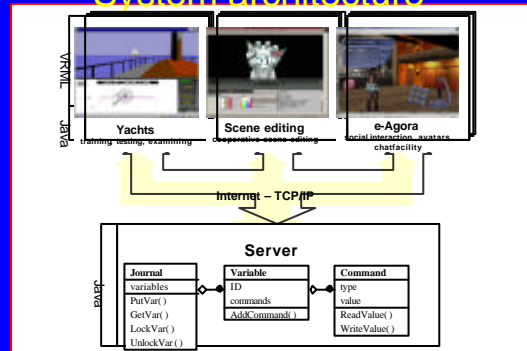
idB cannot be locked iff exist <idA, suf> that
(idA is locked) && (idA == idB+suf || idB == idA+suf)



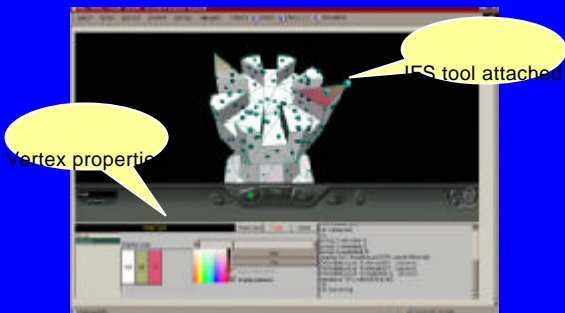
Implementation

- Java (Server + Client side library)
- 3 applications (VRML based)
 - Distant learning (Yachts)
 - Cooperative editing
 - Social interaction (e-Agora)

System architecture



Cooperative editing



e-Agora



e-Agora Video

Real examples:

- Social interaction
- Avatars, chat, gestures

GV: Issues

- Scalability
 - additional GV flag 'reliability' - UDP
- Advanced user management
 - authentication, GV protection
- Limit growing of the journal
 - combining commands

Acknowledgement

Thank you for your attention

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