

# **Software Architecture Modelling, Analysis and Implementation with SoftArch**



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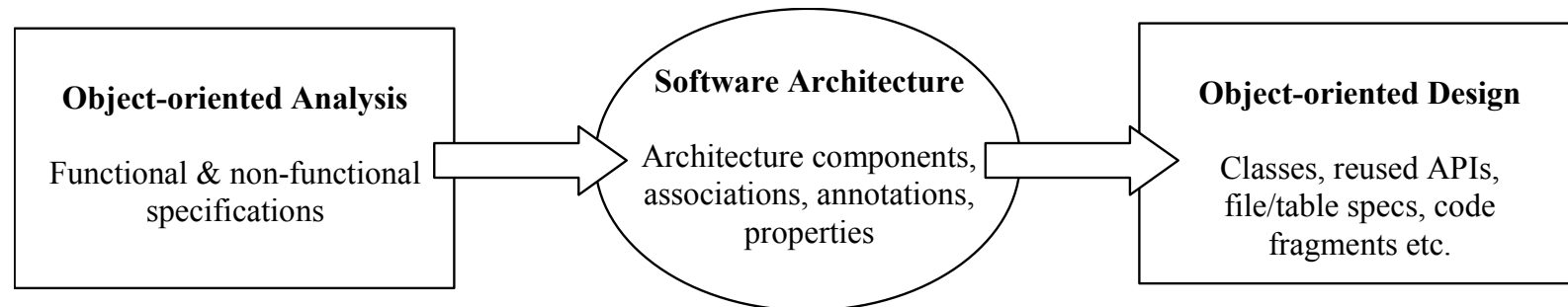
# Overview



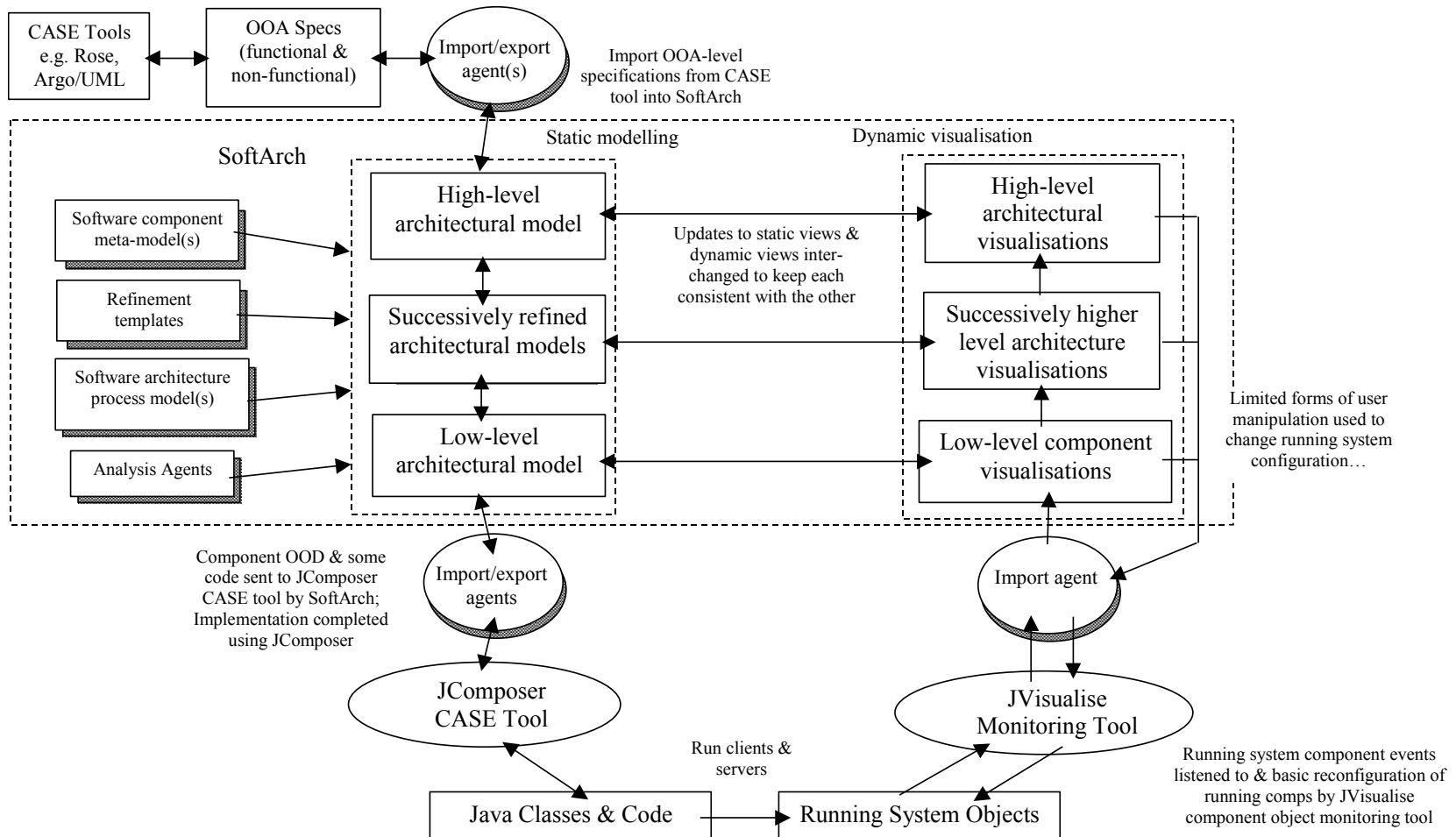
- Software Architecture vs OOA and OOD
- Modelling SAs in SoftArch:
  - Architectural abstractions
  - Refinement
  - Templates
- Architecture analysis
- Architecture visualisation
- SoftArch architecture...

# Software Architecture - our spin...

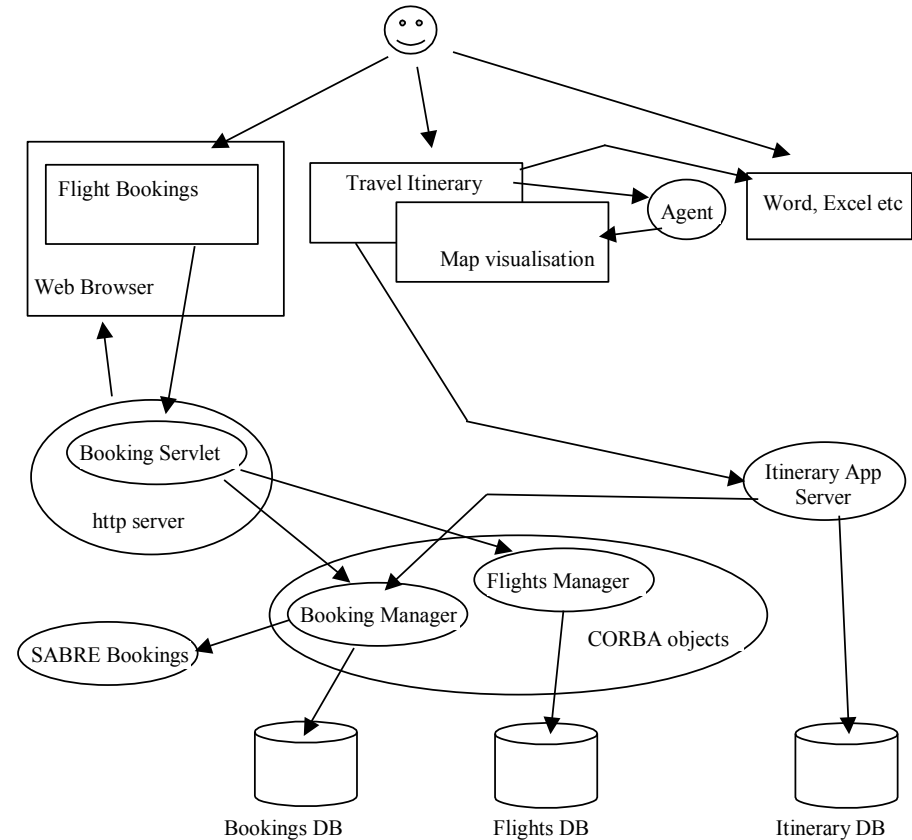
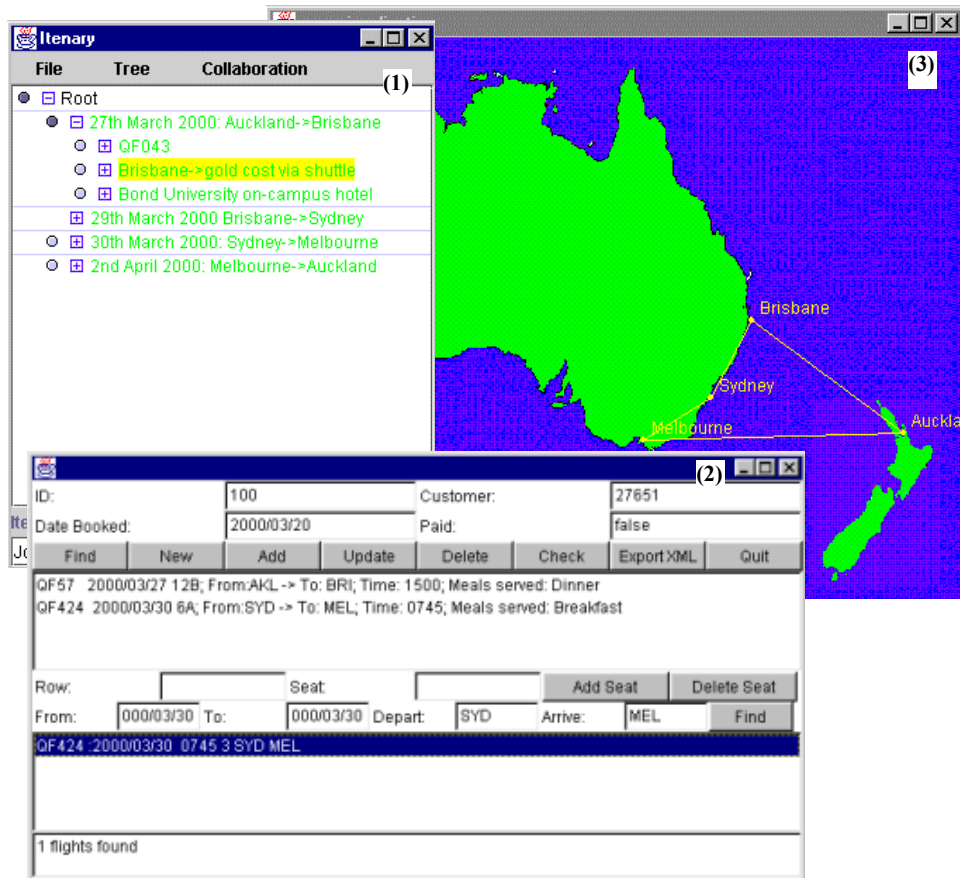
- Translation of OOA specification to OOD design via well-formed refinements
- SA organises OOA for implementation, adhering to functional/non-functional specs



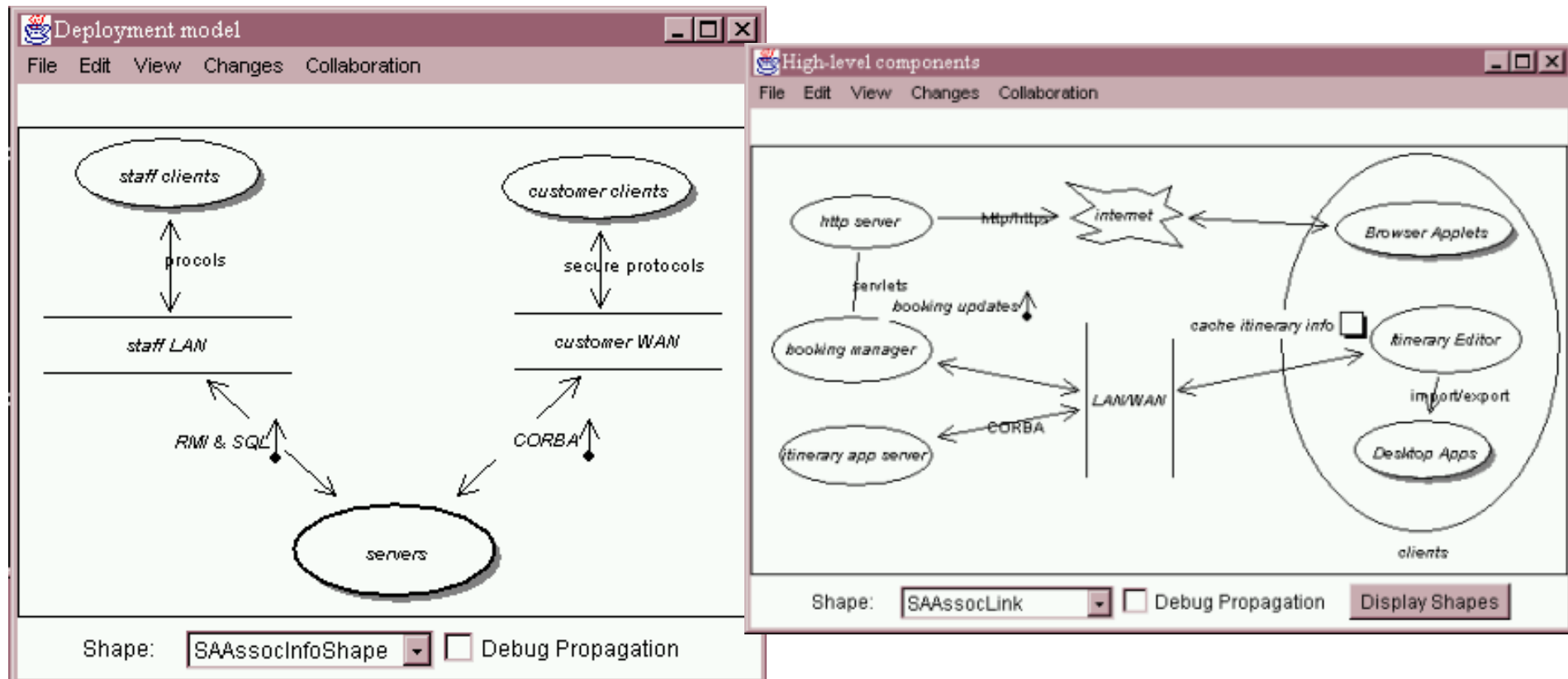
# Overview of SoftArch



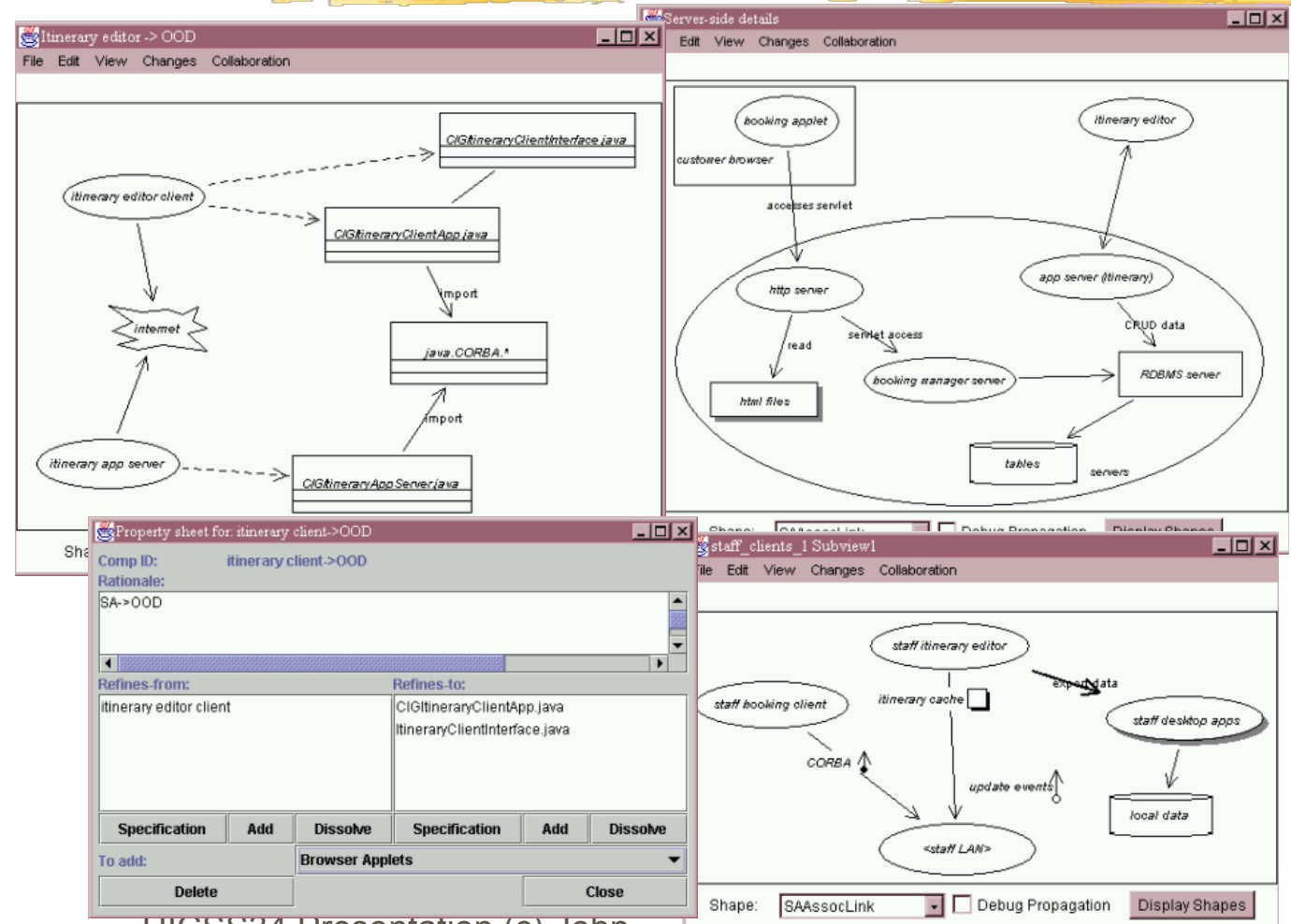
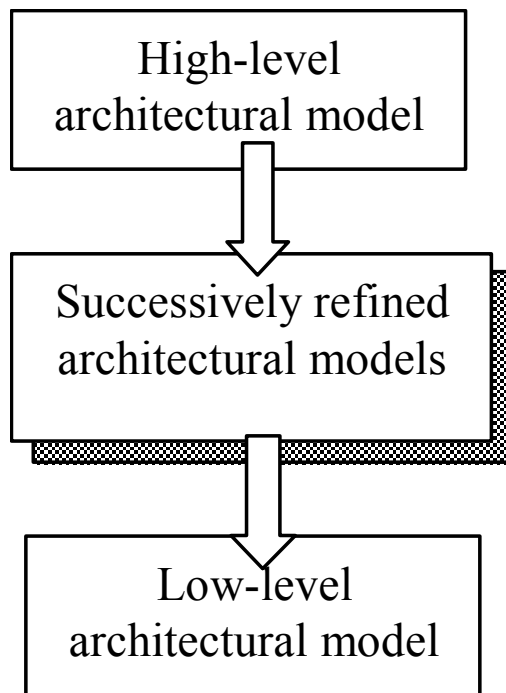
# Example System to Model...



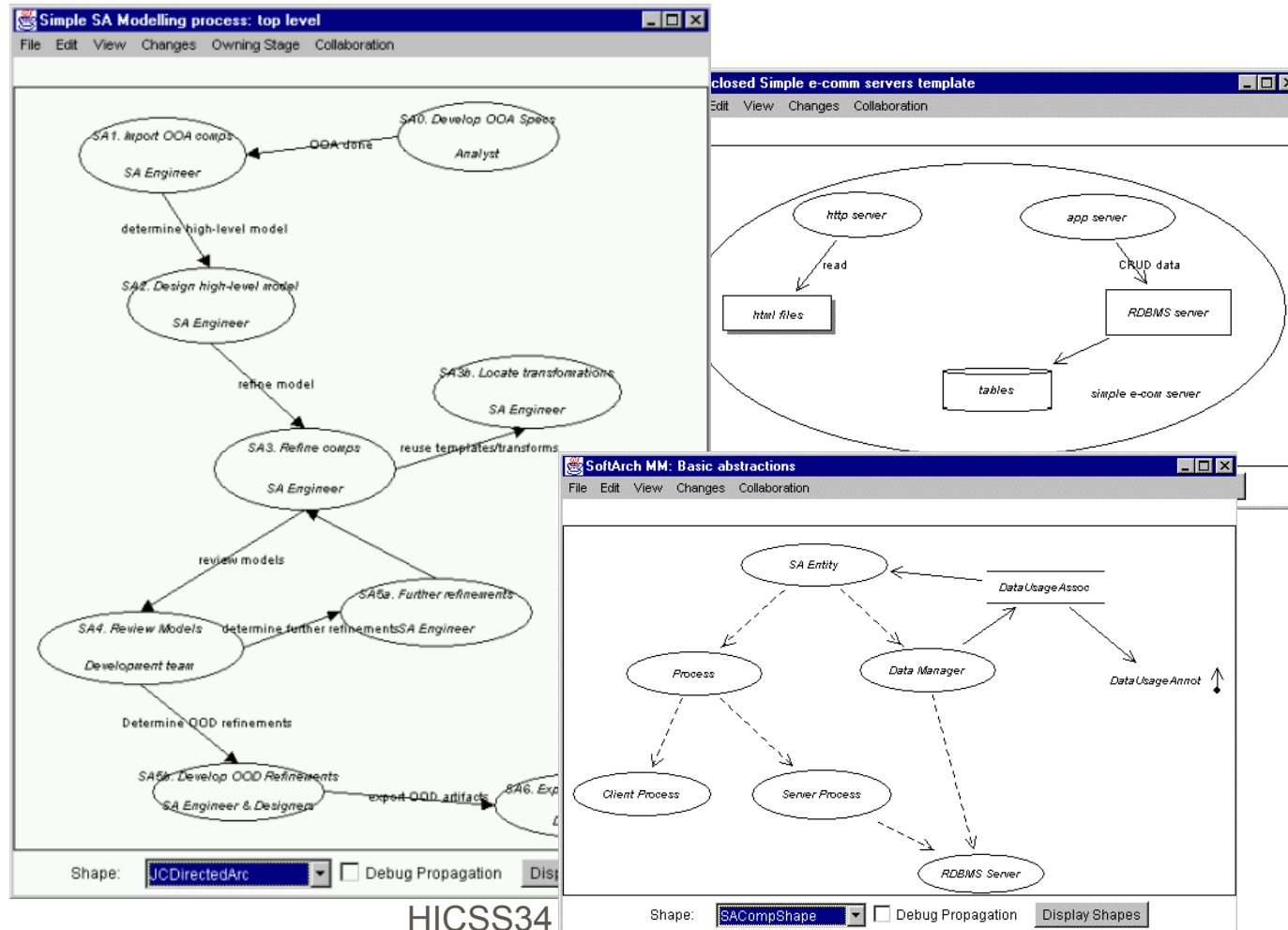
# Modelling...



# Refinement



# Processes, templates, meta-modelling...



HICSS34

Grundy 2000



# Architecture Analysis

The screenshot displays the Critic Manager interface. On the left, a list of critics is shown with checkboxes for 'Enabled', 'Constraint', and 'Critic'. The 'Client Associated with Server Checker' is selected and its details are shown in a larger window on the right. This window contains a complex diagram of components and their relationships, including 'Server Component', 'ComponentsClient', 'AssociateWith', 'No ServerMessage', 'Create Comp', 'Establish Association', and 'Component Checking'. A message report is also visible, listing various issues such as 'http server has no associations to other components' and 'servers has invalid association: staff clients to servers(DataUsageAssoc)'. The bottom of the interface includes buttons for 'More Info', 'Recheck', 'Ignore', 'Views', 'Fix...', and 'Close'.

**Critic Manager**

**Critics**

- Association Checkers
  - Valid Associations Checker  Enabled  Constraint  Critic
  - Has No Associations Checker  Enabled  Constraint  Critic
  - Data Usage Checker  Enabled  Constraint  Critic
  - Message Passing Checker  Enabled  Constraint  Critic
  - Database Access Checker  Enabled  Constraint  Critic
  - Synchronisation Checker  Enabled  Constraint  Critic
- Property Checkers
- Refinement Checkers
- Annotation Checkers
- Network

**Client Associated with Server Checker**

File Edit View Changes Compilation Collaboration

guard #1  
events  
ComponentsClient  
Server Component  
AssociateWith  
No ServerMessage  
fix #1: add host  
fix event  
Create Comp  
Establish Association  
Component Checking

Messages:

- Highest
- High
- Normal
  - http server has no associations to other components
  - http server has no refinements to other components
  - staff client apps has no refinements to other components
  - staff clients to servers has no properties set
  - staff clients to servers has no refinements to other components
  - servers has invalid association: staff clients to servers(DataUsageAssoc)**
- Low
- Lowest

servers type (Process) does not support association of type DataUsageAssoc. Remove this association or change its type.

Fix with: [Dropdown]

More Info Recheck Ignore Views Fix... Close

# Dynamic Visualisation

The screenshot displays a software development environment with several windows:

- Deployment model:** A diagram showing the relationship between client groups and servers.
  - staff clients** and **customer clients** are connected to **staff LAN** and **customer LAN** respectively via **protocols** and **secure protocols**.
  - Both LANs connect to a central **servers** component via **RMI & SQL** and **CORBA**.
- Server-side details:** A detailed diagram of server interactions.
  - customer browser** and **booking applet** access the **http server**.
  - The **http server** reads **html files** and provides **Servlet access** to the **booking manager server**.
  - The **booking manager server** interacts with the **RDBMS server** for **CRUD data**.
  - The **booking manager server** also provides **app server > booking manager** services to the **itinerary editor**.
- SoftArch. Visualisation.S...:** A table showing call statistics:
 

numCreated	3
numCallsFrom	0
numCallsTo	17
numCallsInt	0
- Changes for:** A log of method calls:
 

```

2. CIGItineraryClientApp:3 calls CIGItineraryAppServer:1.getItems(3)
3. CIGItineraryAppServer:1 calls ItineraryItems:1.elements()
4. CIGItineraryAppServer:1 calls ItineraryItems:1.hasMoreItems()
5. CIGItineraryAppServer:1 calls ItineraryItems:1.getNextItem()
6. CIGItineraryAppServer:1 calls ItineraryItems:1.hasMoreItems()
7. CIGItineraryClientApp:3 calls CIGItineraryAppServer:1.addItem(2000/03/29 Sydney)
8. CIGItineraryAppServer:1 calls CIGItineraryItem:18.Create(2000/03/29 Sydney->Me
9. CIGItineraryAppServer:1 calls ItineraryItems:1.addItem(CIGItineraryItem:18)
      
```
- jvis\_trace.txt:** A bar chart showing the number of calls for various procedures.
 

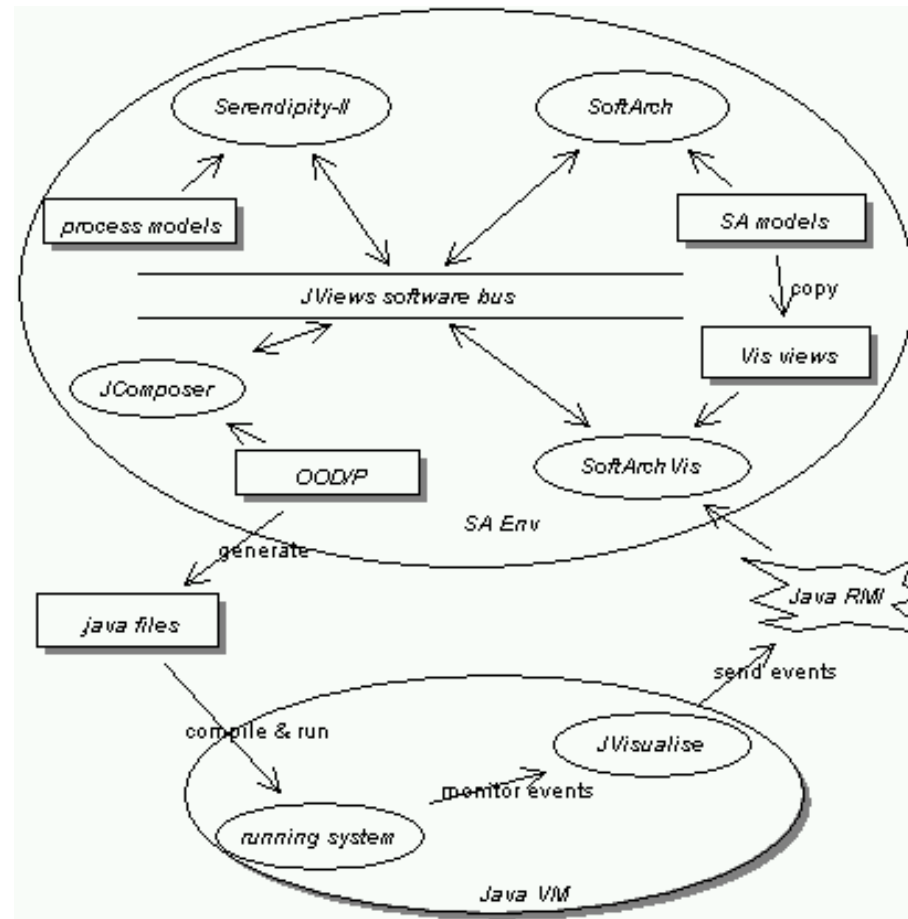
Procedure	Number of Calls
CIGItineraryAppServer:1.getItems(3)	3
CIGItineraryAppServer:1.hasMoreItems()	2
CIGItineraryAppServer:1.getNextItem()	1
CIGItineraryAppServer:1.addItem(2000/03/29 Sydney)	1
CIGItineraryAppServer:1.Create(2000/03/29 Sydney->Me)	1
CIGItineraryAppServer:1.addItem(CIGItineraryItem:18)	1

# Other features...



- Import/export:
  - OOA spec from CASE tool
  - OOD to CASE tool
- Code generation:
  - Limited (currently via our JComposer CASE tool)
  - Planned: generate test bed for MTE project  
middleware analysis examples
- Analysis: MTE & other performance results  
used during modelling/analysis

# SoftArch Architecture...



# References



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