Building Multi-device, Component-based, Thin-client Groupware: Issues and Experiences

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Outline

- Motivation
- Key groupware requirements
- Basic architecture
- Scenario: collaborative travel planning
- Examples of groupware interfaces:
  - Web browser
  - Mobile phone & PDA
- Integration with other thin-client apps
- Design, Implementation & Evaluation
- Conclusions & Future research

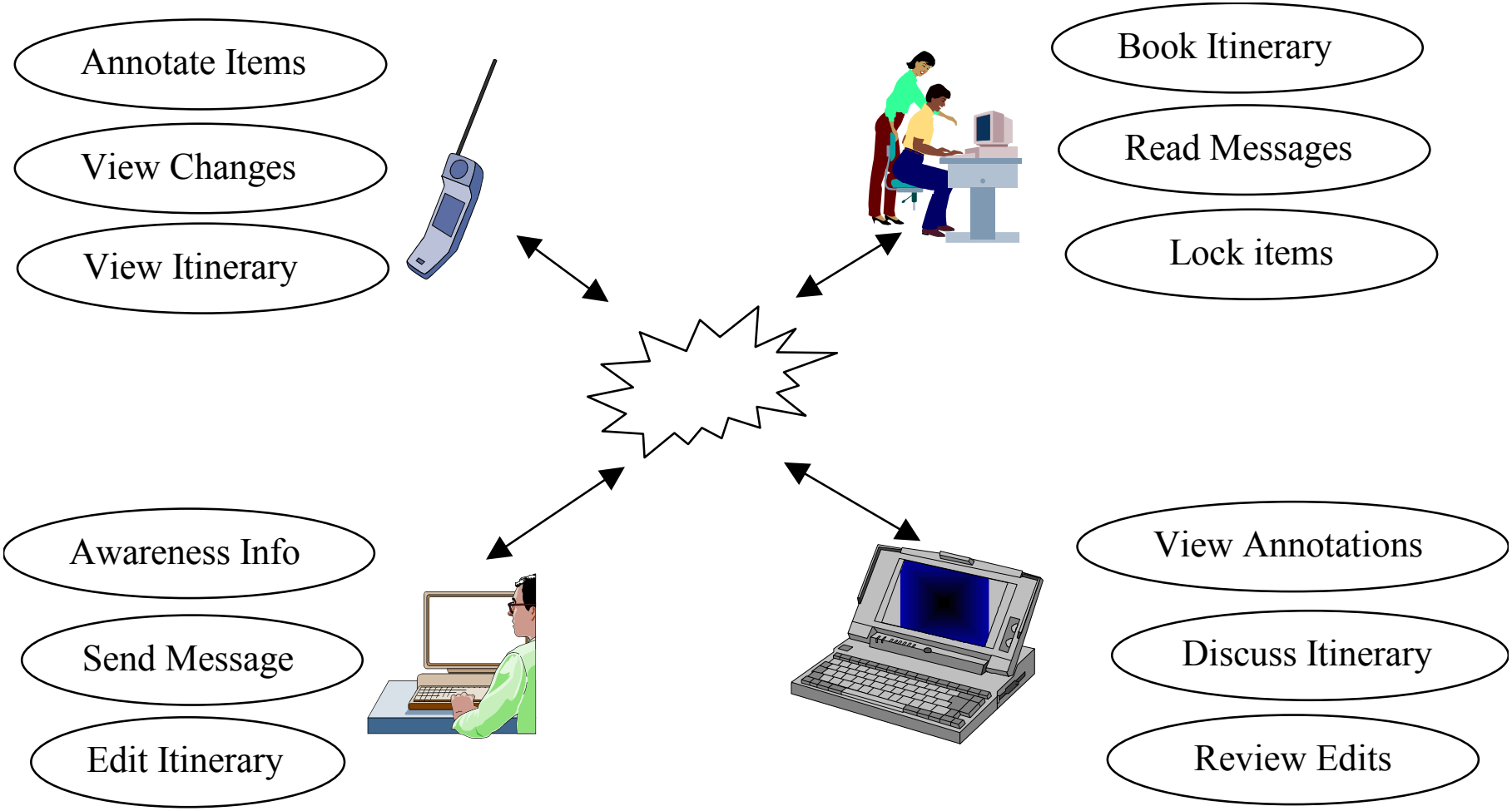
What is “Groupware”?

- Collaborative work support features
- Chat, email, TXT messaging
- Note annotations, highlighting
- Group awareness: multiple cursors etc
- Shared workspaces, floor control, locking
- Shared to-do lists, calendars, workflow
- Video, audio, shared large screen etc support
- Ultimately any multi-user support features

Scenario: Collaborative Travel Planning

- Travel agent(s) and client(s)
- Process:
  - Initial client sketch of travel plans
  - Agent fleshing out of times, flights, accomodation etc
  - Clients revise & discuss with agents
  - Agent Books & Client accesses finalised itinerary
- Groupware:
  - Chat, email
  - Note annotations
  - To-do list, update notifications

Motivation

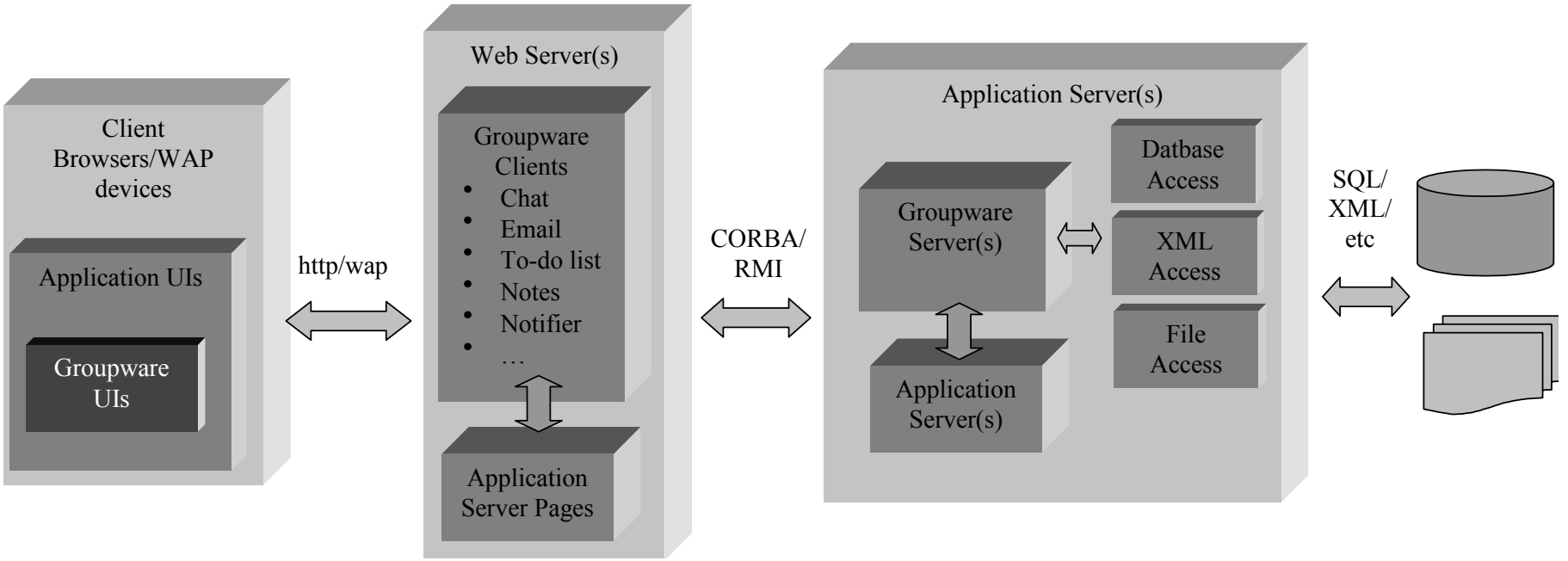

Annotate Items
View Changes
View Itinerary
Book Itinerary
Read Messages
Lock items
Awareness Info
Send Message
Edit Itinerary
View Annotations
Discuss Itinerary
Review Edits

Our Key Groupware Requirements

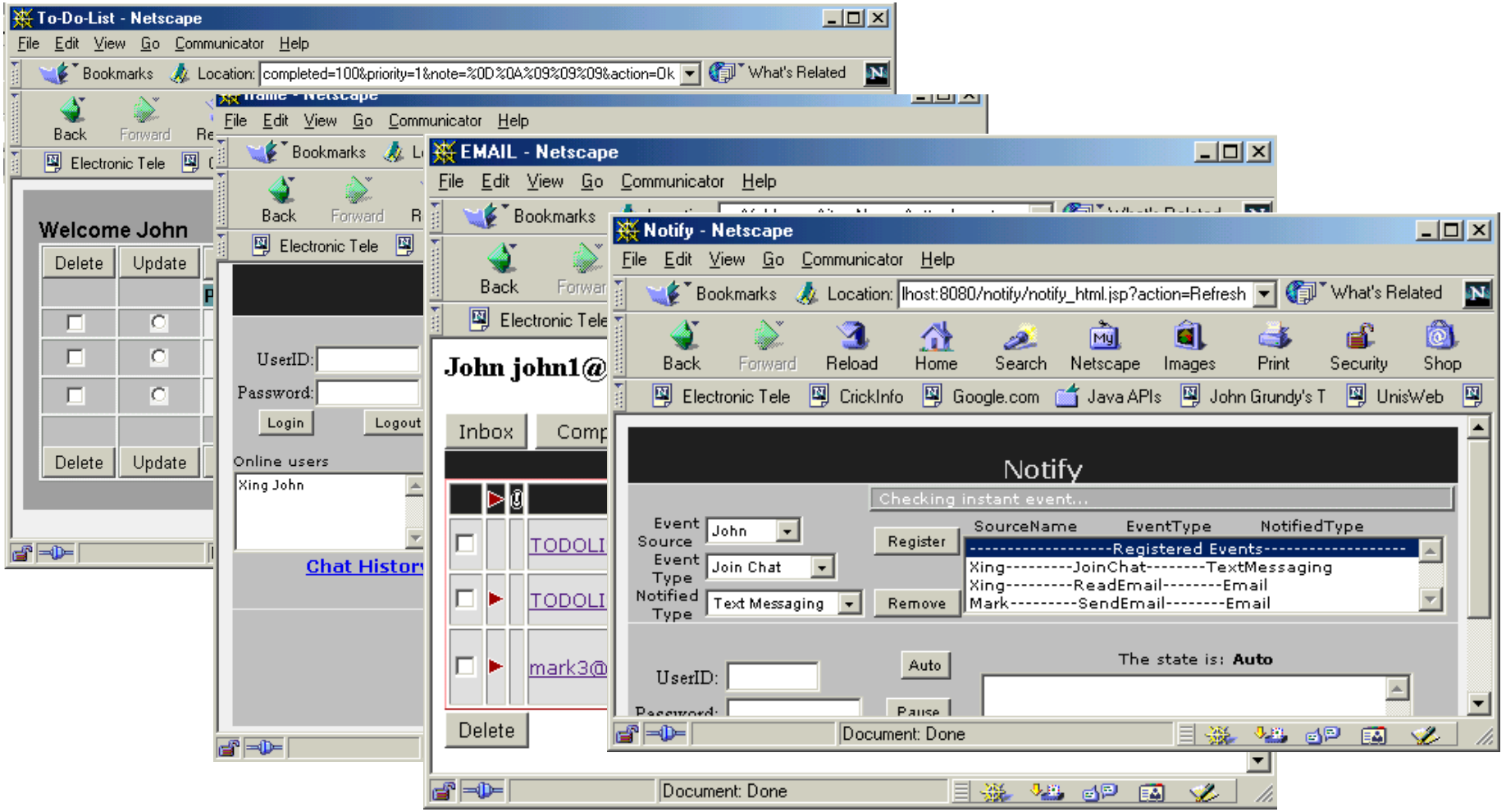
- Supporting thin- and thick-clients
- Adaptability – to devices, locale, users, user tasks
- Compatability & consistency
- Architectures – reuse of server components
- Integration with other applications

- HTML, WML + thick client UIs
- Device, user and task profiles
- Component-based servers and client parts

Basic Architecture



Examples


To-Do-List - Netscape
File Edit View Go Communicator Help
Bookmarks Location: completed=100&priority=1&note=%0D%0A%09%09%09&action=Ok
What's Related
Back Forward
Electronic Tele
Welcome John
Delete Update
Delete Update
EMAIL - Netscape
File Edit View Go Communicator Help
Bookmarks
Back Forward
Electronic Tele
UserID:
Password:
Login Logout
Online users
Xing John
Chat History
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Inbox
TODOLI
TODOLI
mark3@
Delete
Document: Done
Notify - Netscape
File Edit View Go Communicator Help
Bookmarks Location: lhost:8080/notify/notify_html.jsp?action=Refresh
What's Related
Back Forward Reload Home Search Netscape Images Print Security Shop
Electronic Tele CrickInfo Google.com Java APIs John Grundy's T UnisWeb
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Event Source John
Event Type Join Chat
Notified Type Text Messaging
Register
Remove
SourceName EventType NotifiedType
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Xing---------ReadEmail--------Email
Mark---------SendEmail--------Email
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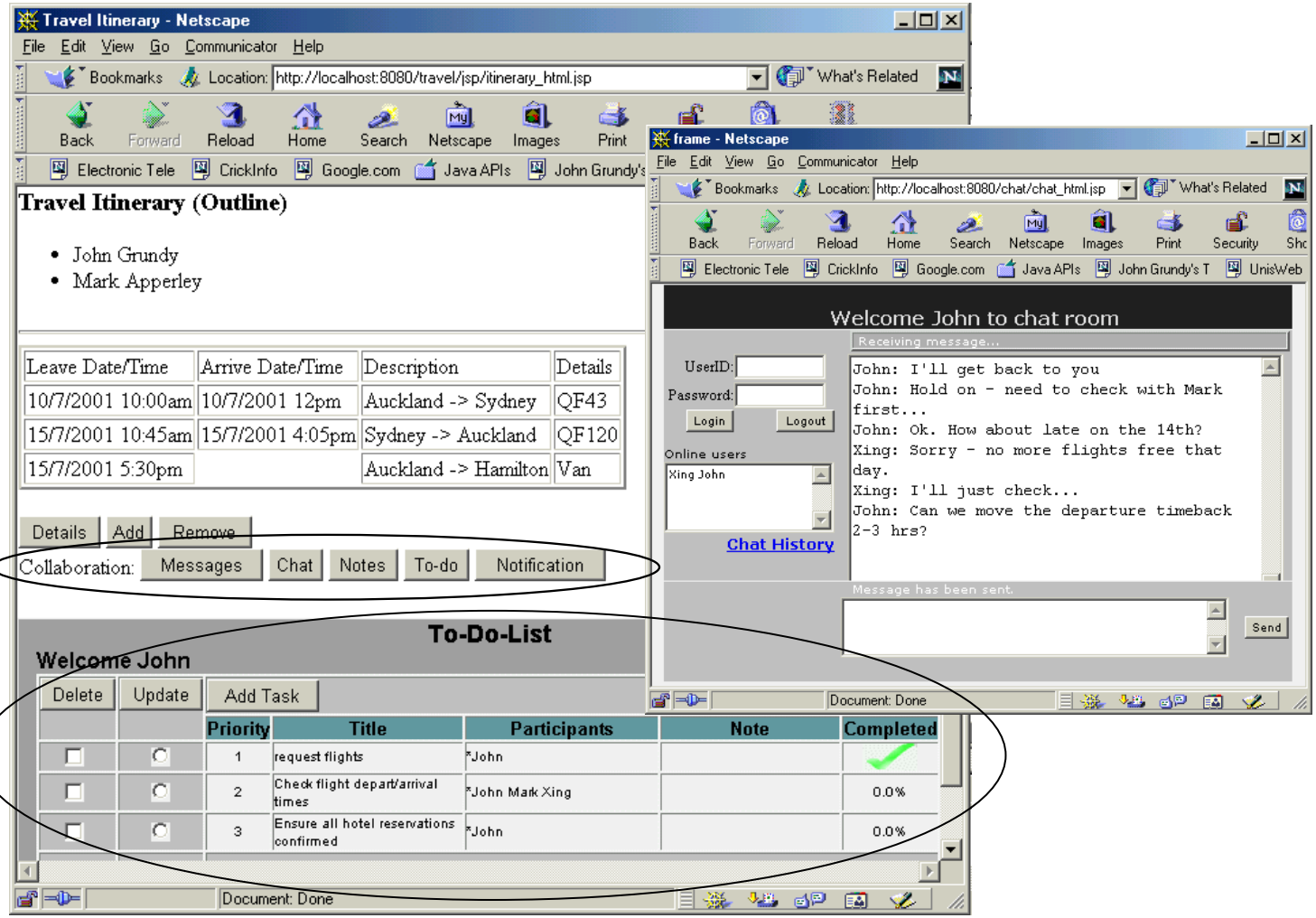
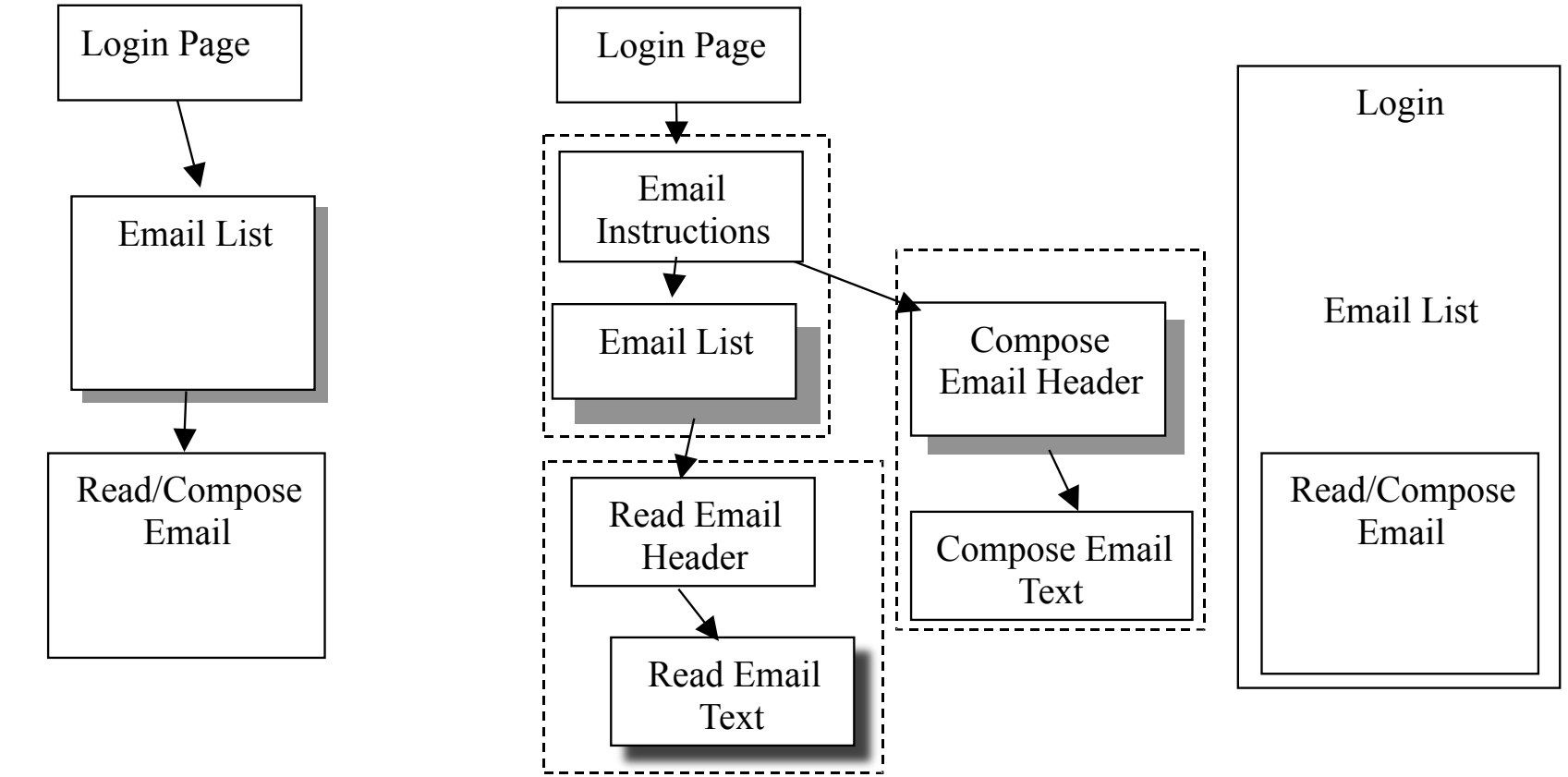
Auto
Pause
The state is: Auto
Document: Done

Mobile User Interfaces

Integration with other thin-client user interfaces



UI Comparison

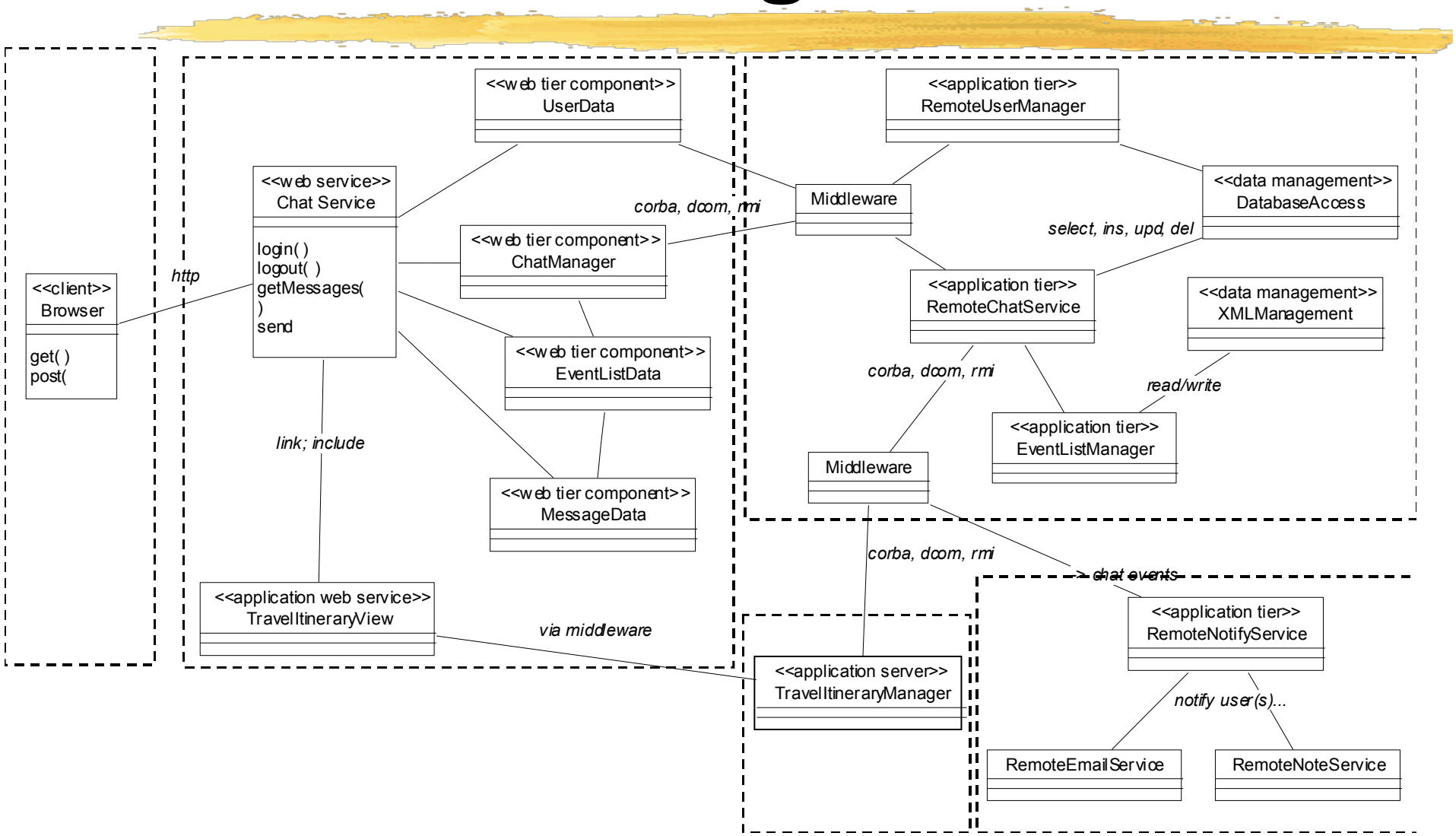


(a) HTML Email Pages

(b) WML Email Cards/Pages

(c) Large Image Display Email Screen

Design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post(
http
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Chat Service
login( )
logout( )
getMessages( )
send
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UserData
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ChatManager
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EventListData
<<web tier component>>
MessageData
link; include
<<application web service>>
TravelItineraryView
via middleware
corba, dcom, rmi
<<application tier>>
RemoteUserManager
Middleware
<<data management>>
DatabaseAccess
select, ins, upd, del
<<application tier>>
RemoteChatService
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XMLManagement
corba, dcom, rmi
read/write
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EventListManager
Middleware
corba, dcom, rmi
<<application server>>
TravelItineraryManager
chat events
<<application tier>>
RemoteNotifyService
notify user(s)...
RemoteEmailService
RemoteNoteService

Experience/Future Work

- Evaluation:
  - Several groups of experienced & novel users
  - Use to perform travel planning and design tasks
  - UIs good; integration not so good
  - Good reuse of server/web-tier parts possible

- Future work:
  - Adaptive UIs – "write once; display anywhere"
  - Improved integration with other thin-client apps
  - Further reuse of server & presentation components
  - Ubiquitous groupware… ☺

References

- Grundy, J.C., Wang, X. and Hosking, J.G. Building Multi-Device, Component-Based, Thin-Client Groupware: Issues and Experience, In Proceedings of the 2002 Australasian User Interface Conference, Melbourne, Australia.
- Grundy, J.C. and Zhou, W. AUIT: Adaptable User Interface Technology, with Extended Java Server Pages, In Cross-Platform and Multi-device User Interfaces, Wiley, 2003.
- Grundy, J.C. and Yang, B. An environment for developing adaptive, multi-device user interfaces, In Proceedings of the 4th Australasian Conference on User Interfaces, Adelaide, Australia, February 3-7 2003.
- Grundy, J.C. and Jin, W. Experiences developing a thin-client, multi-device travel planning application, in Proceedings of 2002 New Zealand Conference on Computer-Human Interaction, July 12-13, Hamilton, New Zealand.
- Cao, S., Grundy, J.C., Stoeckle, H., Hosking, J.G., Tempero, E., Zhu, N. Experiences Generating Web-based User Interfaces for Diagramming Tools, In Proceedings of the 2005 Australasian User Interfaces Conference, Jan 31-Feb 3, 2005, Newcastle, Australia, Conferences in Research and Practice in Information Technology, Vol. 40.
- Grundy, J.C., Hosking, J.G., Cao, S., Zhao, D., Zhu, N., Tempero, E. and Stoeckle, H. Experiences developing architectures for realising thin-client diagram editing tools, Software – Practice and Experience, vol. 37, no.12, Wiley, October 2007, pp. 1245-1283.
- Zhao, D., Grundy, J.C. and Hosking, J.G. Generating mobile device user interfaces for diagram-based modelling tools, In Proceedings of the 2006 Australasian User Interface Conference, Hobart, Australia, January 2006.
- Cao, S. Grundy, J.C., Hosking, J.G., Stoeckle, H. and Tempero, E. An architecture for generating web-based, thin-client diagramming tools, In Proceedings of the 2004 IEEE International Conference on Automated Software Engineering, Linz, Austria, September 20-24, IEEE CS Press, pp. 270-273.
- Abizer Khambati, John Grundy, John Hosking, and Jim Warren, Model-driven Development of Mobile Personal Health Care Applications, In Proceedings of the 2008 IEEE/ACM International Conference on Automated Software Engineering, L'Aquilla, Italy, 15-19 September 2008, IEEE CS Press.