

Demonstrator 1

User Interface and User Functions

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1 Introduction

Demonstrator is to be a prototype for a virtual seminar session program. This paper describes a more detailed specification of the system than the one given in [1].

Sections 1-4 describe the functionality of the Demonstrator 1 software and are from the 4th revision of this document to be treated as final. Sections 5 and forth are implementation specific and will be changed over the next couple of weeks. Section 5 will be updated ultimo this week to reflect the agreements between the different project groups concerning naming of functions and their arguments.

2 Document revision history

1. Started work on Object modeling section. Very preliminary. Early notes on plugin-technology.
2. Incorporated details discussed at the meeting with Christian Gram on October 1st, 1999. Elaborated on Class diagram subsection. Elaborated on Plugins section. Added Sequence diagram. Added meeting minutes from October 2nd meeting to Appendix.
3. Modified dialog sketches. Added section on lower layer function.
4. Added appendix on future versions. Revised sections 1-4 rather thoroughly. They now cover details discussed at the November 11th meeting.

3 Scenario: Virtual Seminar Session

A virtual seminar enables groups of people at separate sites to share thoughts and ideas live, almost as if the were located in the same room. The sites are connected via a network.

Purpose Provide support for live technical discussion with exchange and development of technical ideas information.

Sites Up to three sites¹, each capable of supporting from 2 to 5 participants. Each equipped With a client workstation, a camera, a microphone, a set of loudspeakers and preferably a large monitor. One site must, in addition, be equipped With a workstation, which can function as the leader workstation.

Persons Participants and a seminar leader, who himself is a participant, totalling a maximum of 15 persons.

Shared channels The channels of communications are:

¹More sites will be supported in later versions

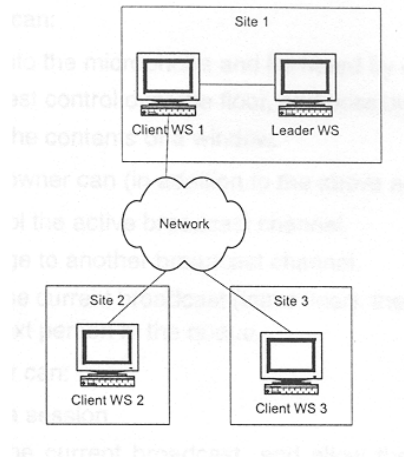


Figure 1: Network diagram

Audio Simultaneous sound broadcast from every site to all other sites. Allowing all participants to listen and be heard.

Video The camera at each site can broadcast live video to all other sites. Only one site at a time can broadcast video. Zoom and orientation is adjusted manually.

White board An electronic equivalent to the traditional white board. All sites can see what's drawn on the board, but only one site at a time may edit its contents.

Program screen One site at a time may broadcast the contents of a program window to the other sites. Examples could be a slideshow, or the calculations from a math program.

Control over the floor One site at a time controls the floor. This means that it is allowed to broadcast to the other sites via the shared channels. In order to gain control over the floor, a site must make a request, and then possibly wait in a queue until its turn comes up. The site at which the seminar leader is located has an extra workstation with special session management facilities.

Roles There are three roles a person can have: listener, floor owner and leader.

- All participants can:
 1. Log on.
- A listener can:
 1. Talk into the microphone and be heard by everyone else.
 2. Request control over the floor, and possibly wait in the queue.
 3. Print the contents of a window.
- The floor owner can (in addition to the above actions):
 1. Control the active broadcast channel.
 2. Change to another broadcast channel.

3. End, the current broadcast (leave floor), thereby giving control to the next person in the queue.
- The leader can:
 1. Start a session.
 2. End the current broadcast, and allow the next person in the queue, control over the floor.
 3. Give floor control to a certain site out of order.
 4. End the session.

More specifically it is the leader workstation, located at the leader site, which offers these facilities. The participant who is also the leader must use this workstation when performing the actions special to him/her.

It will not be possible to leave the queue, once on it. If a participant regrets having requested the floor, he/she has two options: either leave the floor immediately or ask the leader to jump to the next participant in the queue.

Logging off will not be necessary in Demonstrator 1, because of the nature of the seminars it is expected to be used for. In this kind of seminars everyone more or less agrees when the session is over or there is a predetermined end time.

4 Configuration and Functionality

4.1 Hardware

For the scenario described above to be realized, each site must live up to these minimum demands:

1. Workstation with a monitor which has an area large enough for all persons to be able to see its contents.
2. Audio: Microphone and loudspeakers.
3. Video: A fixed oriented camera, a slide projector or a slide show program on the
4. Hardcopy: Access to a printer (locally or via LAN) to enable printouts to be made.

4.2 Test setup

Unfortunately the setup used to test Demonstrator 1 does not live up to the description given above. In reality there were only two computers available. These were connected via an ATM network.

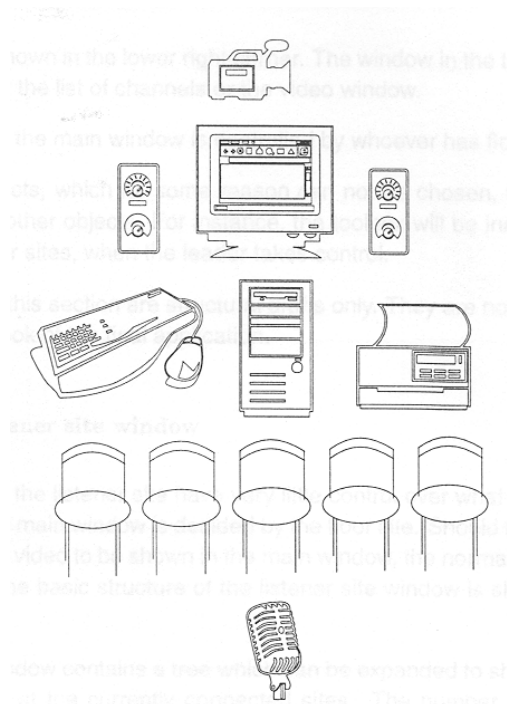


Figure 2: Hardware setup at a site

4.3 Dialog objects

All client sites have a similar window structure, with differences depending on the state of the site. Controls are placed on the left, there is a big main window in the middle, status is shown on the bottom of the screen and the contents of the queue is shown in the lower right corner. The window in the top right corner contains either the list of channels or the video window.

The content of the main window is controlled by whoever has floor control.

Generally objects, which for some reason can not be chosen, will be visually different from other objects. For instance, the toolbox will be inactive (unclickable) at listener sites, when the leader takes control.

The figures in this section are structural drafts only. They are not an attempt to visualize the look of the final application.

4.3.1 A listener site window

Participants at the listener site have very little control over what is shown. The contents of the main window is decided by the floor site. Should the floor owner decide to have video to be shown in the main window, the normal video window turns black. The basic structure of the listener site window is shown on figure 3.

The “Sites” window contains a tree which can be expanded to show the narres of participants at the currently connected sites. The number shown next to each narre the narres relates to the function-key that each participant must press to request the floor.

There are five possible actions for the participants on a listener site participants to execute:

Request floor The floor can be requested in two ways: By clicking the button or by pressing an F-key on the keyboard. If the first approach is chosen, a new window appears in which the participant must identify him /herself. If the second approach is chosen, the F-key number that the user must press corresponds to the number shown next to his/her name in the “Sites” window.

Turn microphone on/off

Print Sends the contents of main window to the attached printer. Leave session

logon Participants can join as long as the seminar is running.

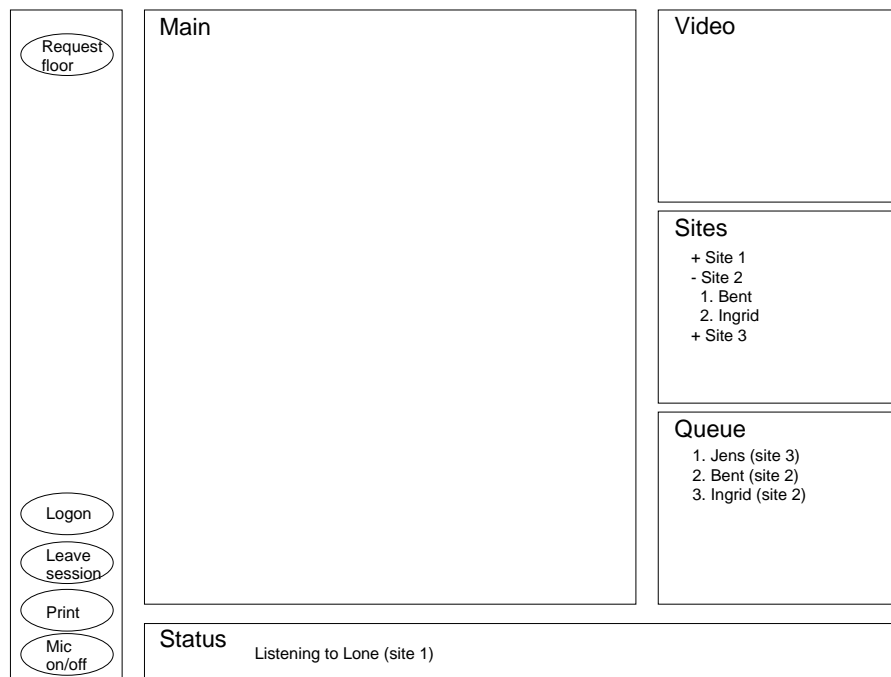


Figure 3: Window at a listener site

4.3.2 The floor site window

The participants at the floor site have some more control possibilities than the listeners, as demonstrated on figure 4. They can still request the floor, in case another participant at that same site also wants control at a later time. In the

Channels window, the floor owner can pick the channel that will be broadcast to the other sites. Users can also still log on even though someone is in control.

When a channel is picked, controls with relation to this channel are added to the control window. This is illustrated on figure 5.

4.3.3 The leader window

The leader has a separate workstation at which administrative tasks can be performed. If the leader wishes to interrupt the current floor holder, and take over control, this is possible. No audio from other sites is broadcast when this is done.

It is also possible for the leader to force the current floor owner to leave the floor, and advance to the next site in the queue.

In the upper right corner the leader can see the list of currently connected sites. By selecting one of these, control can be given to this site "out-of-order". This means that the queue is ignored and control is given immediately to the chosen site.

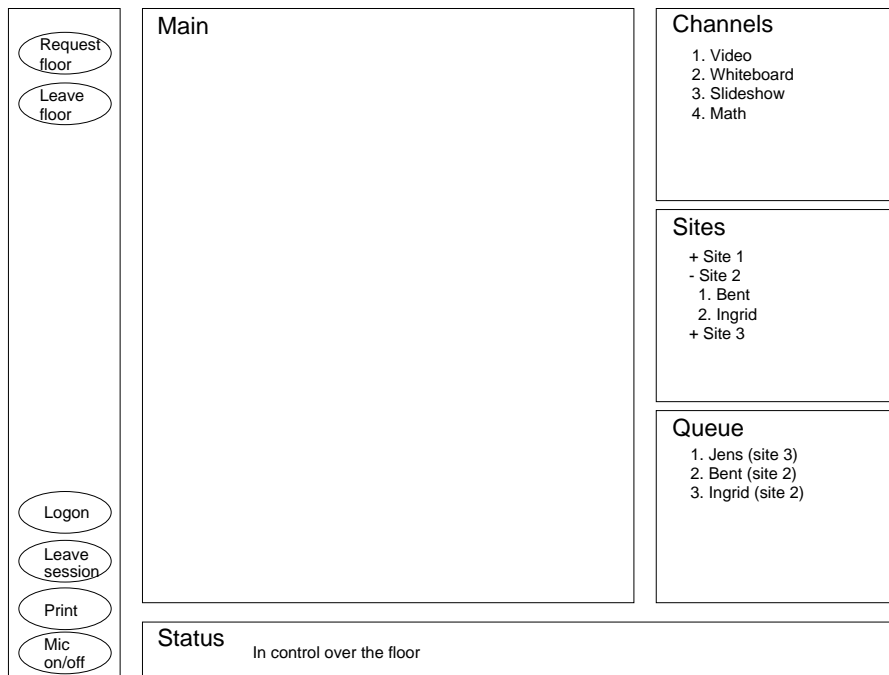


Figure 4: Window at the floor site with no active channel

Finally the leader can choose to end the session. This action will disconnect all other sites.

Thus the toolbox consists of these buttons:

take/release control Alternates between the two possibilities depending on whether or not the leader has taken control.

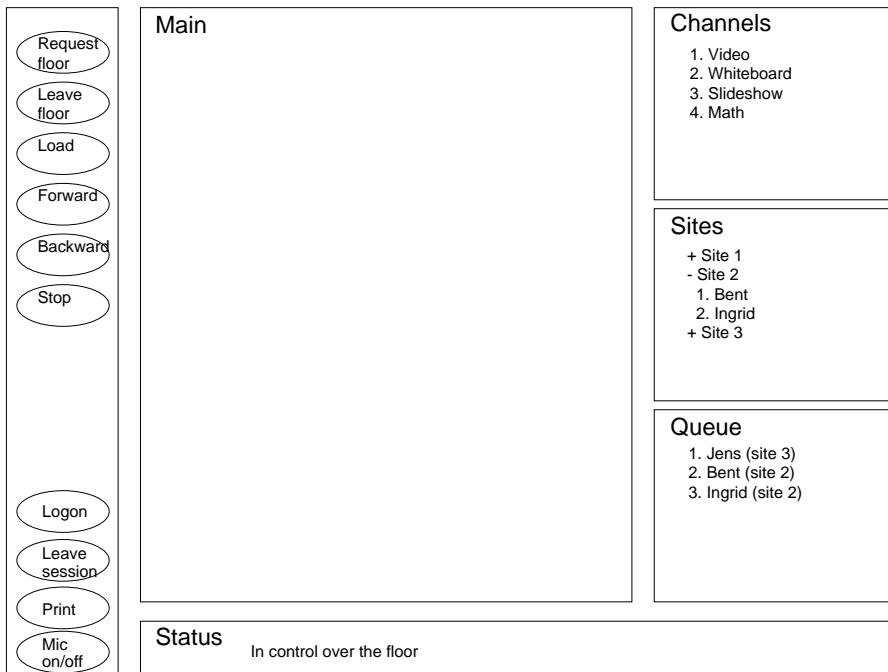


Figure 5: Window at the floor site with the Slideshow channel active

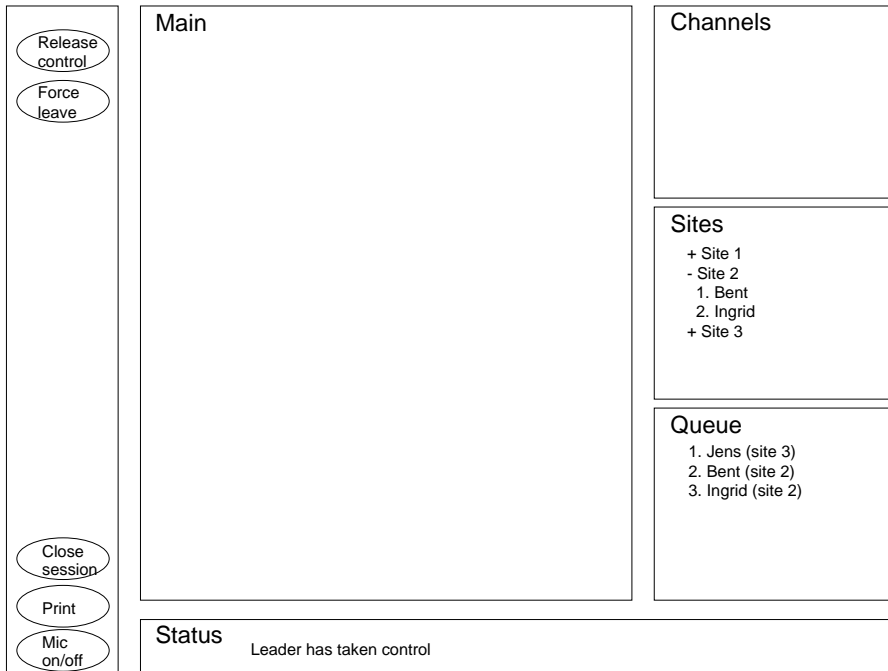


Figure 6: Window at the leader workstation, which has taken control

Force leave Forces the current holder of the floor to leave, moving on to the next site in the queue.

Close session This button will be inactive when the leader has taken control.

5 Object Modeling

From the previous description one can attempt to make a more formal description of the system. This will be done by using UML (Unified Modeling Language).

5.1 Use Case Diagram

5.2 Class Diagram

- Client Workstation
 - Methods
 - connect()** Establish a connection with the host site.
 - leaveSession()** Disconnect from the host site.
 - Properties
 - State** Does this workstation control the floor?
- Leader Workstation
 - Methods
 - beginSession()**
 - endSession()**
 - Properties
 - Queue**
 - inControl**
- Participant
 - Methods
 - requestFloor()** The participant wishes control over the floor. The participant is put in the end of the queue.
 - leaveFloor()** The participant who is in control over the floor wishes to give it up. This method is only available when a participant actually controls the floor.
 - logOn()** A participant enters his/her name into the system.
- Leader
 - Methods

takeControl() Turns the microphones at all Client workstations off and forces the current owner of the floor to be enqueued (on top). Only the leader may speak in this state.

releaseControl() The opposite of TakeControl(). Only possible when in control.

beginSession() Start host services, enable clients to connect.

endSession() Ceases all communication and closes connections. This method can be very disturbing if carried out by error. Thus it will only be available when the leader has taken control.

outOfOrder() Put the current owner of the floor on the top of the queue, and give the floor to someone else.

forceLeave() Force the current owner of the floor to leave it. Give the floor to the next participant in the queue.²

5.3 State Diagrams

5.4 Sequence Diagrams

The contents of one sequence diagram might be as follows:

1. Leader begins session.
2. Site 1 joins session (Participants 1-4 plus leader).
3. Site 2 joins session (Participants 5-9).
4. Site 3 joins session (Participants 10-14).
5. Leader has the floor.
6. Participant 6 (Site 2) requests the floor.
7. Leader leaves the floor.
8. Participant 6 gets the floor.
9. Participant 6 shares the whiteboard channel.
10. Participant 11 (Site 3) requests the floor (and is queued).
11. Participant 6 draws on the white board.
12. Participant 2 (Site 1) requests the floor (and is queued).
13. Participant 6 leaves the floor (Participant 11 gets the floor).

²This method may not be used very often, but it can be helpful if someone for some reason refuses to leave the floor. Nevertheless, having the possibility gives the leader a little more authority.

14. Leader takes control (Participant 11 is queued on top).
15. Leader releases control (Participant 11 gets the floor again).
16. Participant 11 shares the video channel.
17. Leader gives control to Participant 1 (Site 1) out-of-order (Participant 11 is queued on top).
18. Participant 1 leaves the floor (Participant 11 gets the floor again).
19. Participant 11 leaves the floor (Participant 2 gets the floor).
20. Participant 2 shares the Simulation channel.
21. Participant 2 leaves the floor (Leader gets the floor since its empty).
22. Leader takes control.
23. Leader closes session.

6 Plugins

In order to allow for expansion of the software, a plugin technique will be adapted. In this way more kinds of channels can be added. Each channel may have its own associated controls that will be added to the toolbar when it is selected by the floor owner.

6.1 Video

The video channel can be shared in the same fashion as the other channel. The reason for the current holder of the floor to do this might be that he/she wishes to show something to the camera, and that the normal video window is too small for this purpose.

In the future this channel might be supplemented by a channel which allows for playback of digitally recorded video sequences.

6.2 Whiteboard

This is the digital equivalent to the normal whiteboard. The current owner of the floor can draw on the whiteboard using the mouse. A limited number of tools are available (could be "channel color", "draw line", "draw freehand", etc.). The tools that will be included, are to be determined at a later time.

6.3 Slideshow

If the current owner of the floor wishes to show some slides he/she has prepared, this can be done using the slideshow channel. The exact technology to be used will be determined later.

6.4 Math

This channel will allow the presenter to demonstrate some simulations or calculations using some math software. The more elaborate details on this channel will also be decided on later.

7 Implementation

7.1 Communication with the network layer

In order for the user interface to work properly, the network layer must be constructed and the functions that allow for the user interface to interact with it must be defined.

7.1.1 Leader Workstation

Below are the functions necessary for the leader workstation. Notice that there are no functions relating to the queue. This is to be handled at a higher level.

beginSession() Return value indicating success or failure.

endSession() Return value indicating success or failure.

takeControl() Return value indicating success or failure.

releaseControl() Return value indicating success or failure.

giveFloor(site) Give the floor to the specified site.

takeFloor(site) Take the floor from the specified site.

7.1.2 Listener Workstation

connect() Return value indicating success or failure. Only one host site will be supported in the first version of Demonstrator.

disconnect() Return value indicating success or failure.

send() Depends on the implementation of streams.

receive() Depends on the implementation of streams.

requestFloor() Return value indicating success or failure.

leaveFloor() Return value indicating success or failure.

micOn() Return value indicating success or failure.

micOff() Return value indicating success or failure.

A Future versions

Demonstrator 1 will be followed by more advanced versions as the lower layer functionality matures. The test setup will be expanded to include more sites, and more hardware, such as bigger monitors, extra cameras, etc. will be added.

One of the ideas that have been mentioned is that one camera per site will be able to automatically turn towards and focus on the person currently speaking. It has even been suggested that voice recognition technology be used, allowing for the user interface to display the name of the person in control over the floor.

Instead of using the F-keys on the keyboard to request control over the floor, each participant might be given a special “buzzer”. This will not change the user interface however.

As a consequence the user interface will most likely also change. Among the improvements/changes one could imagine making are:

1. Expanded queue control for the leader.
2. One video window per site showing the general camera view.

B Meetings

B.1 October 1st, 1999

These were the subjects discussed:

Cardreader To ease the process of registration of participants or even the process of requesting the floor, a keyboard with a magnetic cardreader could be introduced. To request the floor all a participant would have to do was to run his/her card through the reader. This idea was discarded, because there is presently no need to register participants.

Dedicated workstation for the leader To simplify the user interface, it was agreed that the functions for the leader are to be handled at a separate workstation. The leader himself will still be able to participate in the meeting via a client workstation placed on his site.

Large screen obligatory It was established that the large screen is not to be obligatory. This would only have been relevant, however, if the dedicated workstation for the leader was not agreed upon. The idea was to avoid "crowding" the workstation.

Whiteboard Is to be an online version. Even though electronic whiteboards that allow drawing on them with a pen and transferring the results to other sites exist, these are currently too expensive and don't work too well.

Take control/leave control This button will change functionality depending on the current status of control.

Close session The question of when a session can be closed by the leader was discussed. The tentative solution that the leader must first take control was agreed upon.

Next site/out of order In the first draft of this document there were two buttons for handling the queue. The definition of their functionality was a little vague. Maybe they were overlapping. If the leader gives the floor out-of-order to the first site in the queue, does this mean that it is removed from the queue when the user chooses leave floor? This may pose a small problem if the user who received out-of-order control with the floor is not the same as the user who is currently at the top of the queue.

Separating the leader workstation will allow for greater freedom with the user interface, making it clearer how the queue can be administered by the leader.

Platform The operating system of choice will be Linux. The programming language of preference is Java - for now. The suitability to the task of this language is to be determined by AWS.

Lower layers Elaborating on the user interface also means trying to define which functions will be necessary to fetch data from the lower layers. That is the layers that transport data to/from the participating sites.

Jini was suggested by CG as a technology to use.

Meeting with other participants The meeting with the people working on the dataflow structure will be arranged on the next meeting.

Next meeting October 15th, 1999.

B.2 October 21st, 1999

Report The latest (not yet typed in) version of the report was presented.

Next meeting When Allan has sent the latest version of the report by email, a date can be set for a meeting with the other people working on the project.

B.3 November 11th, 1999

Participants: Hans Henrik Lvengreen, Christian Gram, Robin Sharp, Lars Bjerregaard, Martin Clausen, Edward Todirica, Allan With Srensen.

- LB and MC gave a short introduction to how they have used JINI to create a chat-system.
- Demonstrator 1 Draft revision 3 by AWS was accepted, with these comments:
 - A facility which allows for the identification of the other sites currently connected.
 - HHL asked if communication from session-control to the UI would be necessary. AWS answered that this would indeed be the case.
 - There must be a way for each participant to ask for control over the floor.
- In future versions there will be two cameras per site. One for a general view, and one to point at the person currently in control over the floor.
- Voice recognition will be implemented at a later stage. This will allow for automatic identification of the person in control over the floor.
-

B.4 November 18th, 1999

Participants: LB, MC, ET, AWS.

The subject of this meeting was to discuss interfaces between the different layers.

We agreed that the naming conventions would be the same as those used in JAVA.

References

- [1] Gram, Christian: "Demonstrator 1: User Interface and User functions". 1999.
- [2] Mouritzen, Nicolai; Juul, Lars: "DTU-RTMM: Demonstrator 1". Lyngby. 1998.
- [3] Lvengreen, Hans Henrik: "DTU-RTMM Software Architecture". Draft 0,1. 1999.
- [4] Todirica, Edward; Bjerregaard, Lars; Clausen, Martin: "Demonstrator 1 - Top Layer Interfaces". Draft. November 21, 1999.