

II. Appendix II. Details of Experiment 2

Below are procedures and handouts for experiment 2, as they were submitted to the Institutional Review Board.

Procedures

Sept. 16, 2004

The subject pool will be computer science graduate students, primarily those in Dr. Fox's CS5604 class, but open to other graduate students as well. They will be recruited by an in-class call for participation in research on visual representation of information. At least 30 students will be involved. The age range will be that of computer science graduate students, about 23 to 40. The study is open to both males and females.

This research involves testing what concepts people find most important in theses/dissertations, what relations among concepts they find most important, and how they would display these concepts and relations visually/spatially.

Subjects will be asked to answer questions, complete diagrams, and draw concept maps, all tasks that they might be asked to do in a classroom setting. Each subject will participate in only one session. Total time commitment for each subject will be 2-3 hours. The study will be conducted in McBryde 102. Subjects will examine theses, concept maps, and related documents. The subjects will be digitally audio-taped while they perform these tasks, and will be encouraged to say aloud their comments on the theses, concept maps, and tasks.

Subjects will first be asked to do a short learning-style inventory. Then they will fill out a subject profile form. They will also be asked to rate their experience level with the three subject areas (computer science, industrial system engineering, science and technology Studies). The form will not ask for subjects' names, so the subjects will be completely anonymous based on the data collected. The software that the subjects will use will provide them with a random four digit number solely for the purpose of differentiating one subject from another. This will insure their anonymity.

Subjects will be asked to read/skim 3 theses, which can be from three departments (CS, ISE, STS). Each subject will have 30 minutes to skim each thesis. After skimming each thesis, each subject will be asked to complete four tasks, a brief description of which is listed here.

Task 1:

The first task is to list the most important concepts in each thesis, and then to rank the concepts in order of importance.

Task 2:

For the second task, the subject will be presented with a bipartite graph with nodes that are labeled with concepts. The subject will then be asked to draw links between relevant nodes, and to label those nodes.

Task 3:

The subject will then be asked to draw a concept map of the thesis, in any style they find

most appropriate.

Task 4:

The subject will be presented with three computer-generated concept maps. One will summarize at the top level, one at the chapter level, and another at the chapter level but organized in a different way. He/she will be asked to rate each concept map using a Likert Scale on its node selection, link selection, and usefulness in summarizing the thesis. Also we will ask each participant which concept map is preferred.

Participant # ____

Date: ____/____/2004

Subject Profile for ETD Concept Map Experiment

1. Have you participated in an experiment on information retrieval/information visualization before? ____
2. Do you have experience in the computer science area of digital libraries? ____
If so, how many semesters? _____ semesters
3. Do you have experience in Industrial Systems Engineering (ISE)? ____
If so, how many semesters? _____ semesters
4. Do you have experience in Science and Technology Studies (STS)? ____
If so, how many semesters? _____ semesters
5. How long have you been a graduate student/researcher at Virginia Tech or elsewhere? _____
6. How many theses have you read/carefully skimmed in your time here at Virginia Tech? _____
7. How many theses in the past year (that is, since last summer) ? _____
8. How many theses in the past month? _____
9. In general, what was your purpose in reading them?
 - i. Finding specific information
 - ii. Discovering open problems
 - iii. Orienting yourself to a research area
 - iv. Other (please describe) _____
10. The last time you read a thesis, did you find what you were looking for?
A) Yes B) No
11. The last time you read a thesis, did you find other useful information that you did not originally intend to look for? A) Yes B) No
12. What was the average amount of time you took to read/skim each thesis?

13. If there were a powerful tool which could help you find information in theses, would you consider using it?
 - A) Yes
 - B) No

14. Assuming such a tool did exist, what would be three tasks you would want it to do? Please list in order of importance, with (1) being the most important.

(1) _____

(2) _____

(3) _____

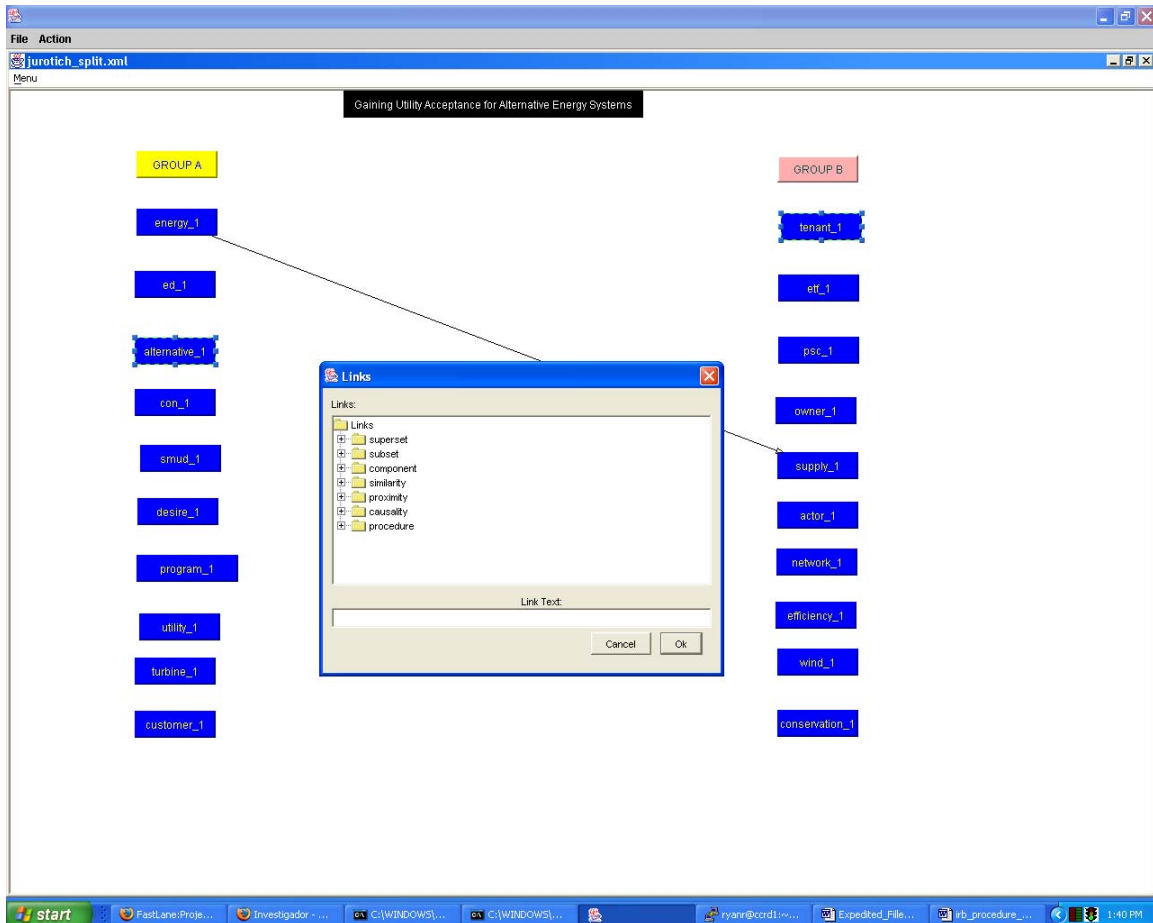
Task 1

Please list the 10 to 15 most important concepts in the thesis you just read. List in order from most important to least important. Note that a concept can be expressed as one word, or as a phrase.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

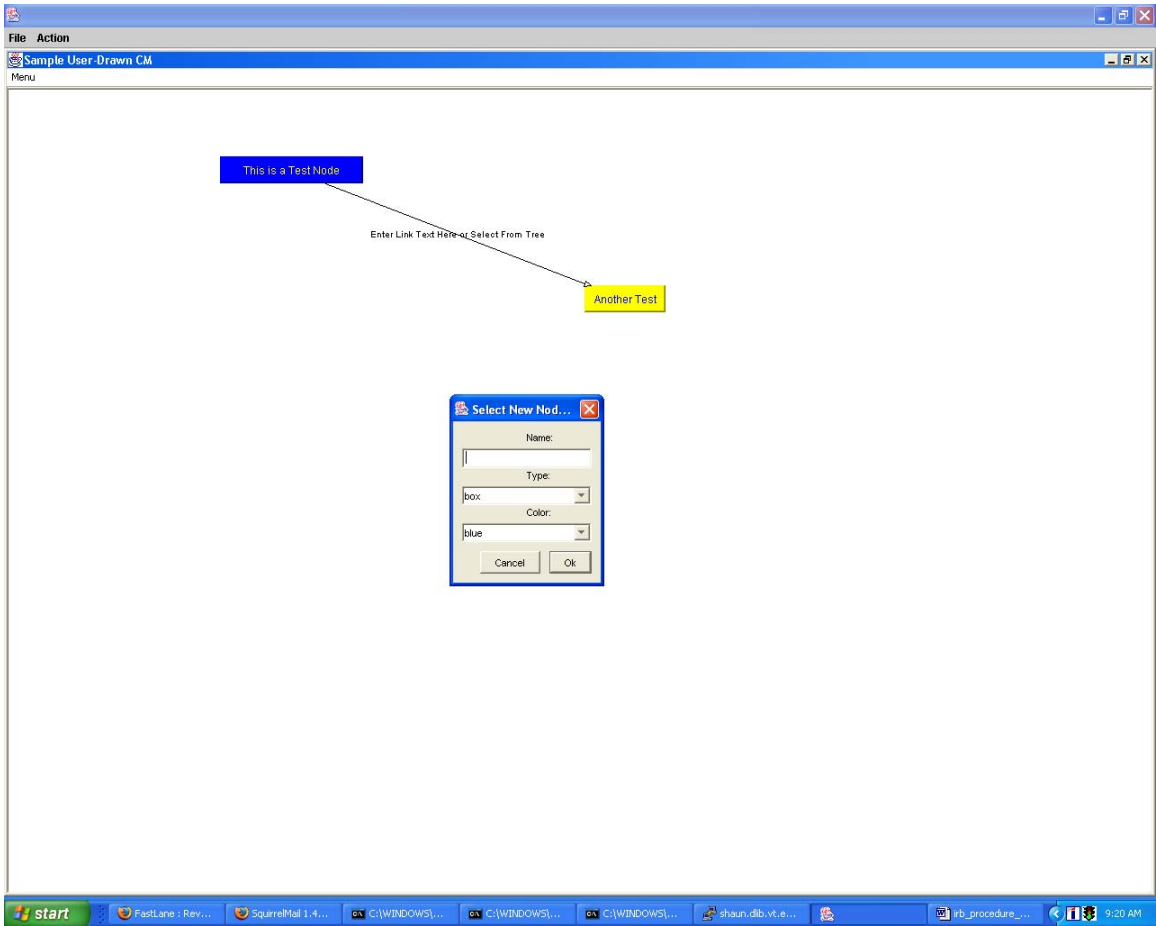
Task 2

In the following graph, the nodes on the left are labeled as being in group A, and the nodes on the right are labeled as being group B. If a node in group A is related to a node in group B, please draw links between them. When you draw a link, also write a label that explains the relationship. Examples of relationships are 'is a', 'has a', etc.



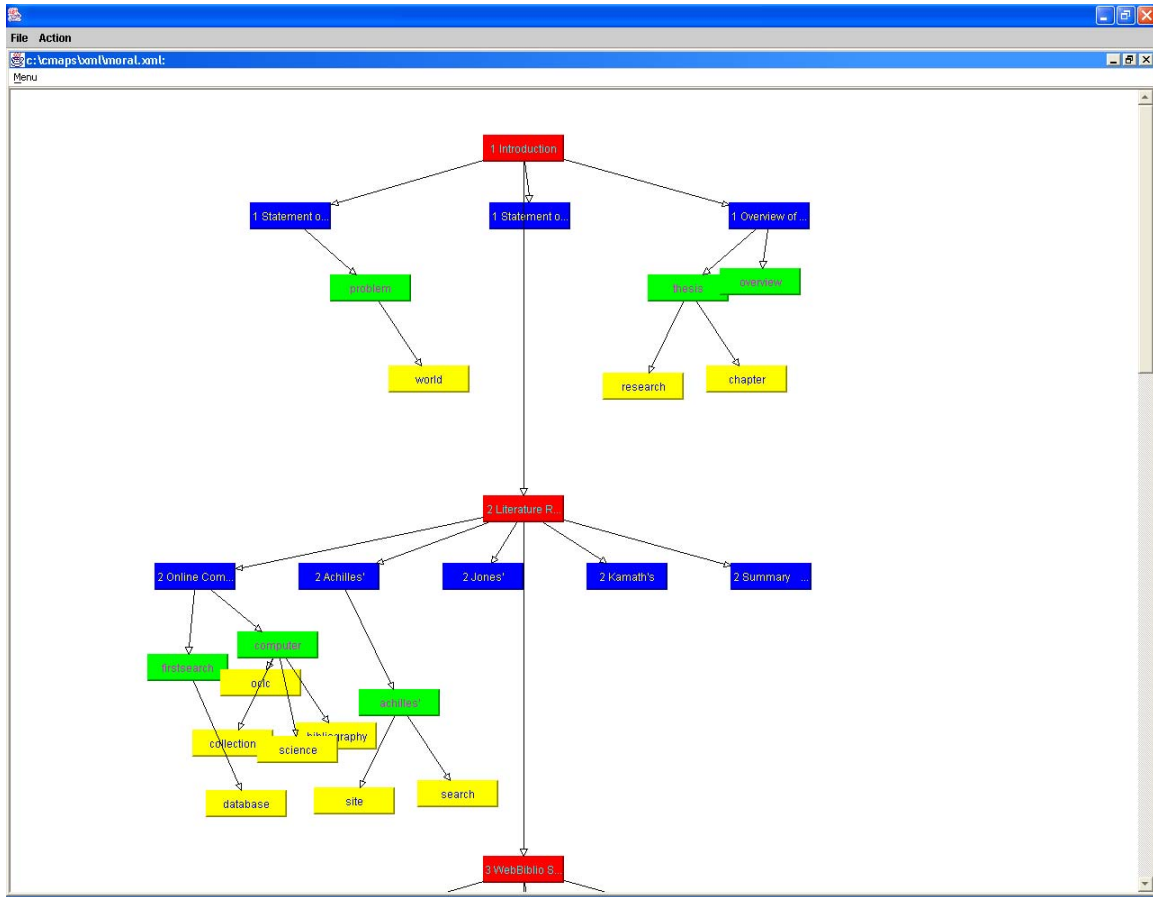
Task 3

Now draw a concept map of the thesis/dissertation that you just examined. Feel free to use any style concept map that you feel appropriate.



Task 4

Examine the concept map below. Once you have examined it, please circle the number that best describes your opinion of the statement.



1. The nodes in the concept map correspond to the most important concepts in the ETD.

Strongly disagree **1** **2** **3** **4** **5** Strongly agree

2. Based on the label text, the links in the concept map connect the proper nodes in the concept map.

Strongly disagree **1** **2** **3** **4** **5** Strongly agree

3. The relationships expressed by the links in the concept map are the most important relationships in the ETD.

Strongly disagree **1** **2** **3** **4** **5** Strongly agree

4. The concept map is useful for summarizing the ETD.

Strongly disagree **1** **2** **3** **4** **5** Strongly agree

Results for Experiment 2

Learning Style inventory results

	Learning Style Inventory			
Subject	Column 1 (emotional)	Column 2 (observing)	Column 3 (analytical)	Column 4 (active)
3682	3	4	5	0
8680	0	5	7	0
1274	2	1	5	4
9790	0	0	7	5
7126	0	4	7	1

As one can see, all 5 participants score highest in Column 3 (analytical).

Task 1

Below are the concepts that the users listed for each thesis. Each user read 2 theses.

#1:

1. Political and cultural affects on the Design of US space shuttle and soviet Buran.
2. Introduction to US space shuttle
3. Introduction to Soviet Buran
4. How Technology and Politics together affect Space shuttle designs of US shuttle and Soviet Buran.
5. Impact of the culture
6. Political problems such as ambiguities, budget problems, affect of cold war, reluctant support from military, role of certain personalities in the development.
7. Requirement of US space shuttle are Cross range capability, reusable space transportation.
8. Requirements behinds soviet Energia buran are Demise of N1 moon rocket, fearful of perceived US space shuttle.
9. Soviet's adeptness in adapting quickly to new technologies and developing inexpensive alternatives.
10. Other PHD related work is on the affect of social factors on the US space shuttle development.

#2:

1. High performance computing issues in Large scale molecular statics simulations
2. Challenges are sequential and parallel improvements in programs to the implementation of the S/W tools.
3. Increase resource sharing, fault tolerance
4. Contemporary high performance systems
5. Molecular statics problem-physics of a metal crystal computing inter-atomic forces and minimize total associated energy.
6. Parallel computing system - Check pointing, which can be done using binary checkpointing, paradigm oriented, CUMULUS
7. Parallel computing system - Migration of processes

- 8. Queueing environments
- 9. Earth science meta system

#3:

- network infiltration
- social relationship
- network models
- Hughes
- actor-network theory
- case study
- cause of conversion
- network alliances
- electric industry
- technology

#4:

- One packet
- Linda-LAN
- tuple space
- interprocessing communication
- performance
- parallel processing
- L-kernels
- network-based computing environment
- message passing
- waiting time

#5:

- LINDA Model
- Parallel Processing Paradigms
- LINDA architecture and implementation
- Drawbacks of LINDA
- Improvements on the LINDA model
- Advantages of using one packet vs two during socket reading
- Changes to code and architecture for using 1 packet
- Testing methods
- Uses of computing-intensive and I/O-intensive test programs
- Implementation details of the new LINDA paradigm
- Graphical representations of performance improvements
- Discussions of overall concepts
- Open Problems
- Other suggested methods of improving LINDA

#6:

- 1. WWW browsing

2. User experience
3. User interface
4. Importance of feedback
5. Tabbed and Tree-indexing UIs
6. Browsing preferences
7. System UI Usability evaluation
8. Tasks for evaluation of users' WWW browsing preferences
9. Experimental settings
10. Parameters that affect WWW browsing

#7:

Cultural and political issues can effect the design process.

Sometimes you have the people with the power and money but knowing nothing about how to achieve a goal adversely influencing the person that actually knows how to get it done.

Pride seemed to drive NASA's goal of making everything innovative and original while the Soviets were more than willing to do whatever it took to achieve their goal (copy ideas, etc)

In some ways, the Soviets had a better design (ex. their shuttle could carry a human crew with it but didn't need to, NASA's had to have a crew)

Despite this, the Soviets had no good motivation for doing the project so it was quickly shelved.

The background of the designers at NASA (being from the airforce) influenced the way they made this new "aircraft".

Prior knowledge and experience is a powerful determinant in how things are designed.

#8:

Use of existing technology (cable TV) is the most effective way of diffusing a new innovation (internet)

New users were comfortable with the interface because they had no prior reference point for browsing the Net.

Experienced users judged the system in relation to "normal" web browsing that they were accustomed to.

A lack of equipment or simply intimidation may make a new technology such as the Net unusable.

Complex tree structures must be build in an intuitive manner to be understandable.

Shorter system lags were less frustrating to the user and caused less errors.

active feedback from the system was more powerful than passive feedback.

tabs-based interface is preferable by users to a 1 to 1 map.

#9:

1. SCOT
2. culture setting
3. politics
4. technology style

5. technology design
6. U.S. space shuttle
7. NASA
8. Soviet space shuttle project
9. technical products
10. implicit design goals
11. explicit design goals

#10:

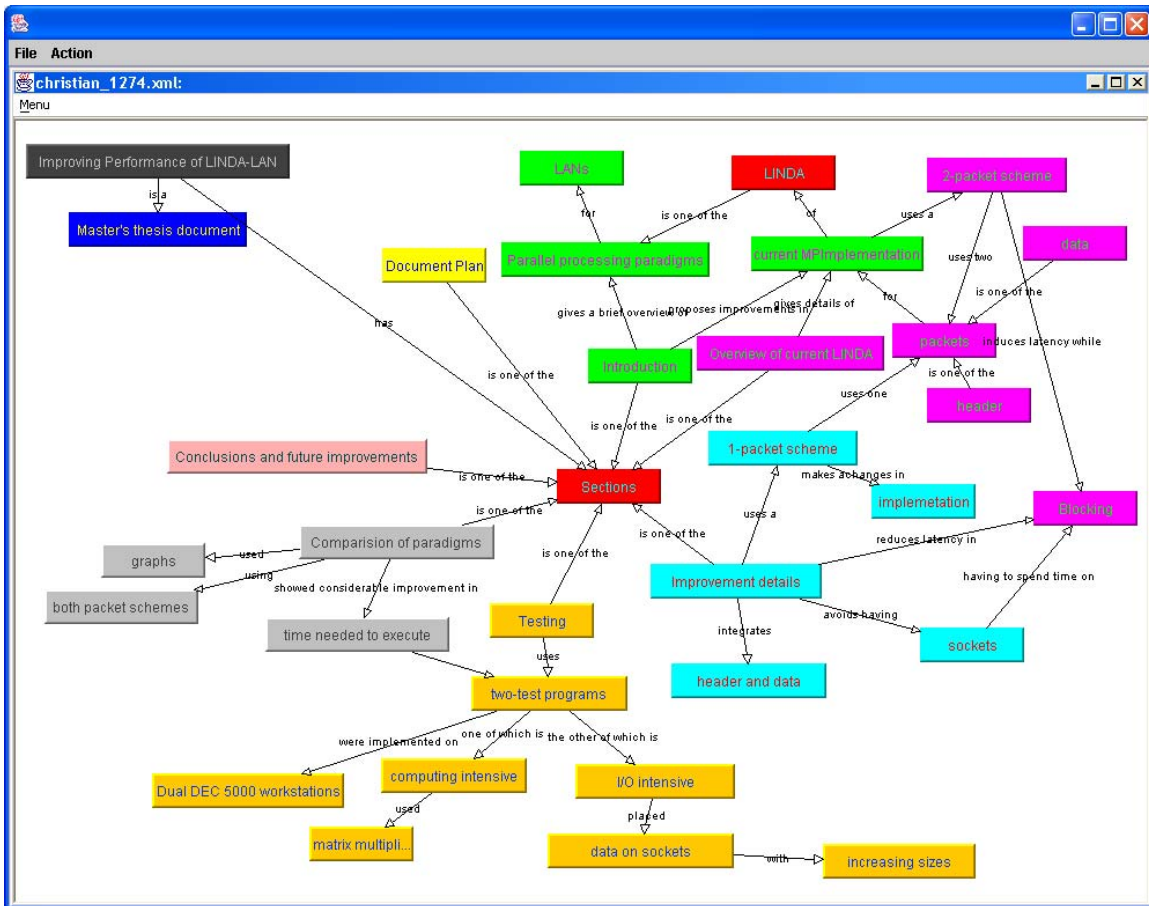
1. Linda-lan
2. Linda paradigm
3. parallel processing control framework
4. performance
5. goals of the project
6. interprocess communication
7. tuple space
8. tuple space operation
9. control subsystem
10. data subsystem
11. experiment
12. 2 packet schema
13. single packet
14. head packet
15. data packet

Task 2

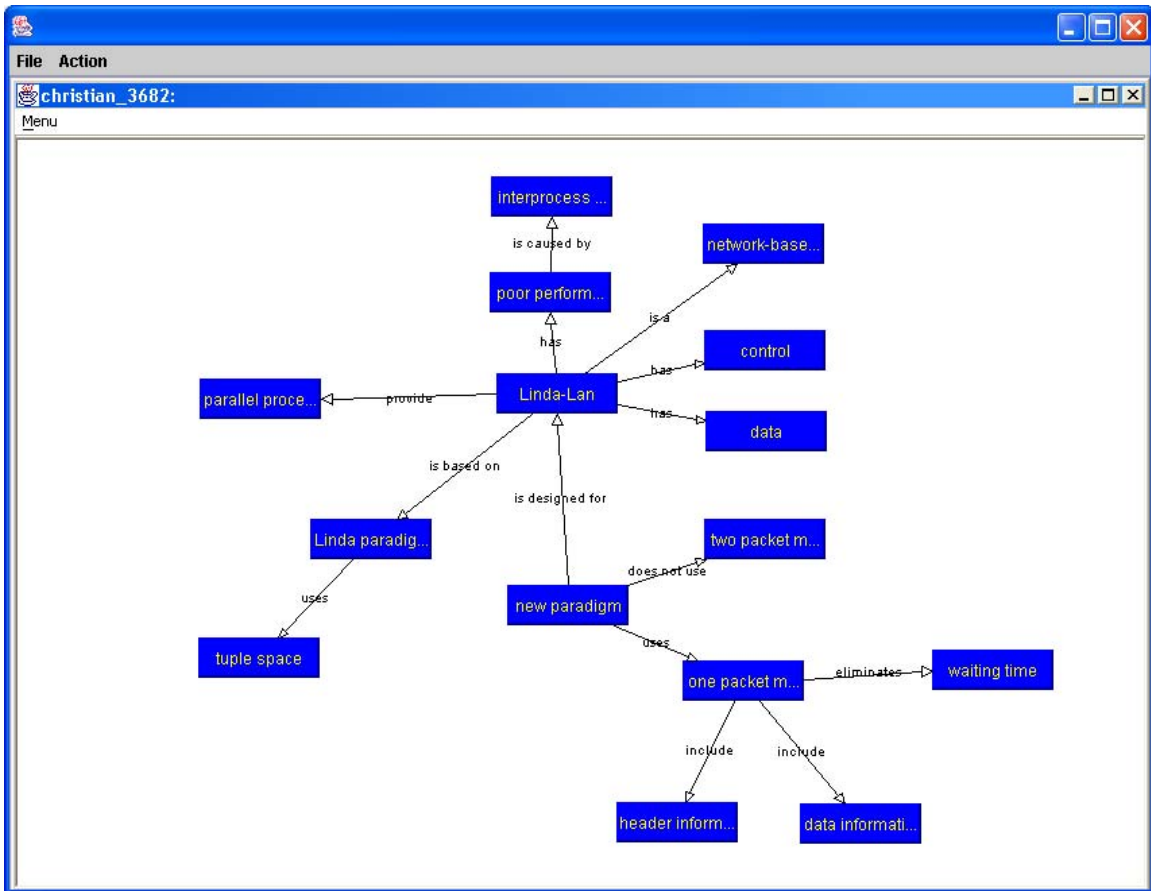
Task 2 (providing links between experiment-provided concepts) proved to be difficult to evaluate and so was not further analyzed.

Task 3

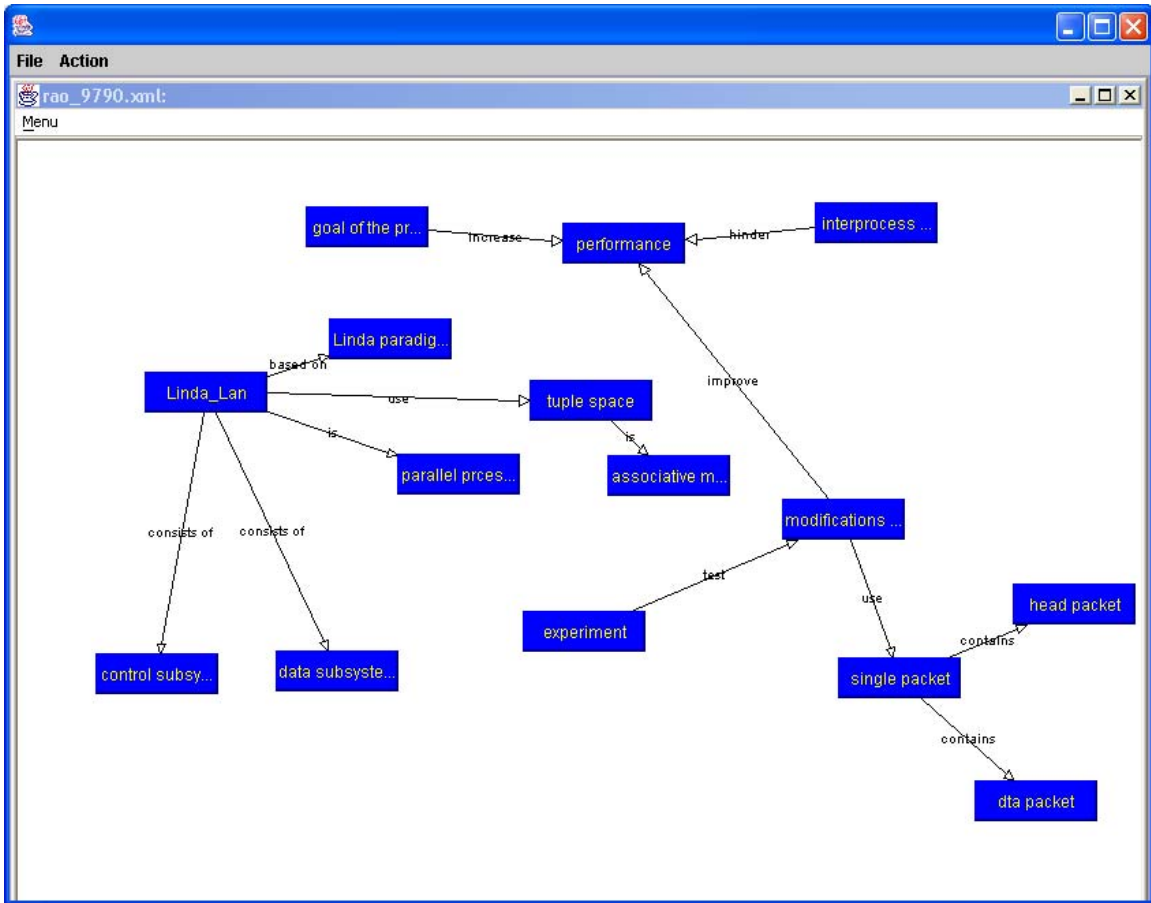
Below are the all concept maps that the users drew as part of Task 3. **Note:** Some maps are only readable if printed in color.



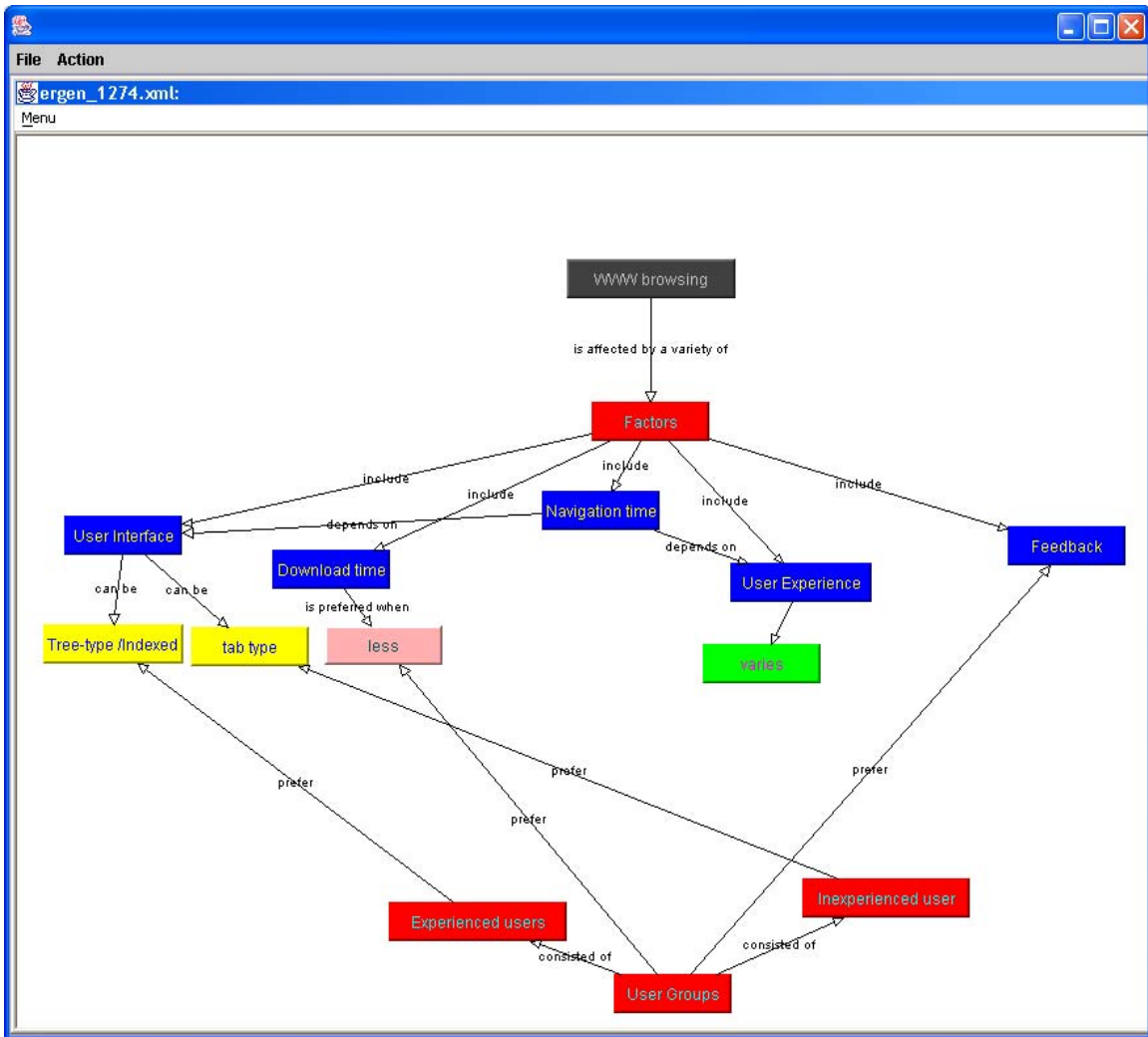
App. II. Figure 1: Concept map drawn for experiment 2, task 3.



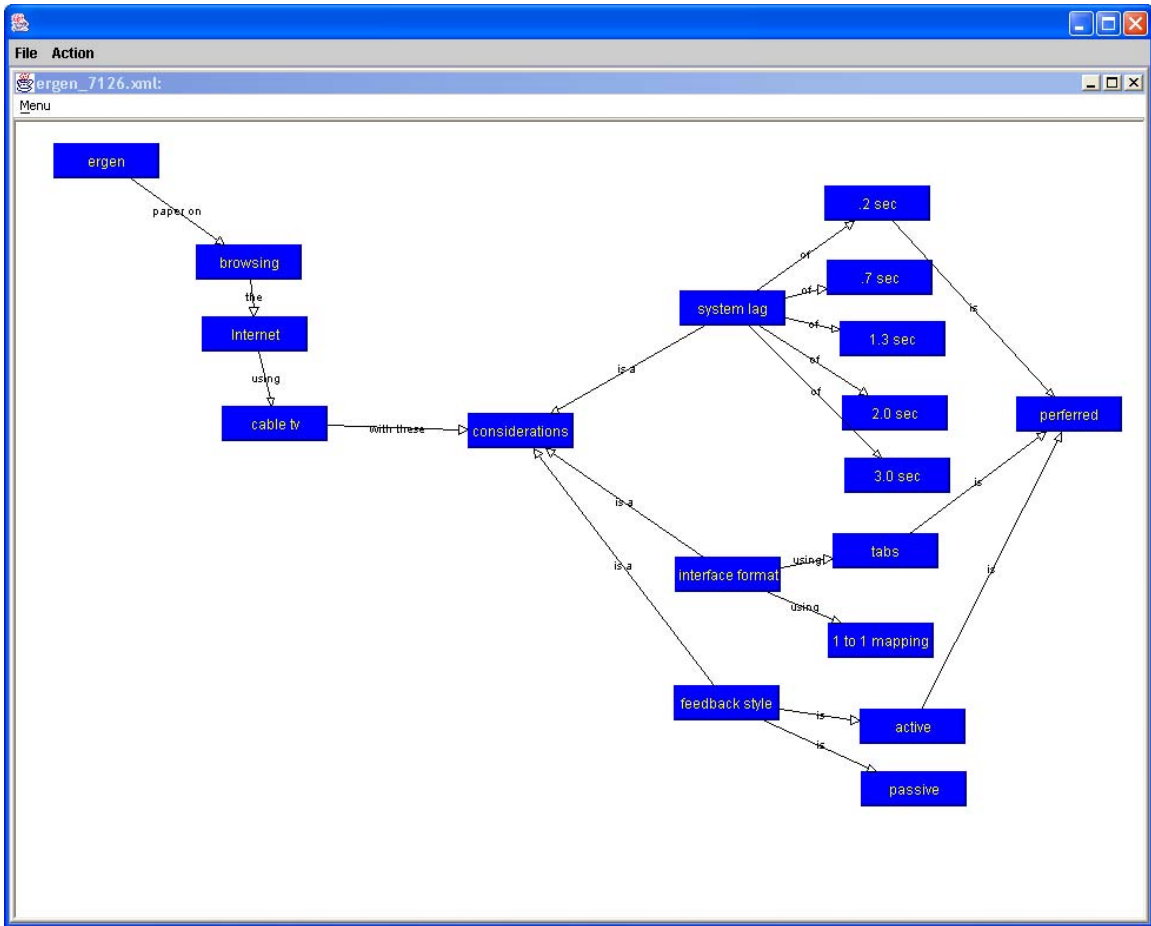
App. II. Figure 2: Concept map drawn for experiment 2, task 3.



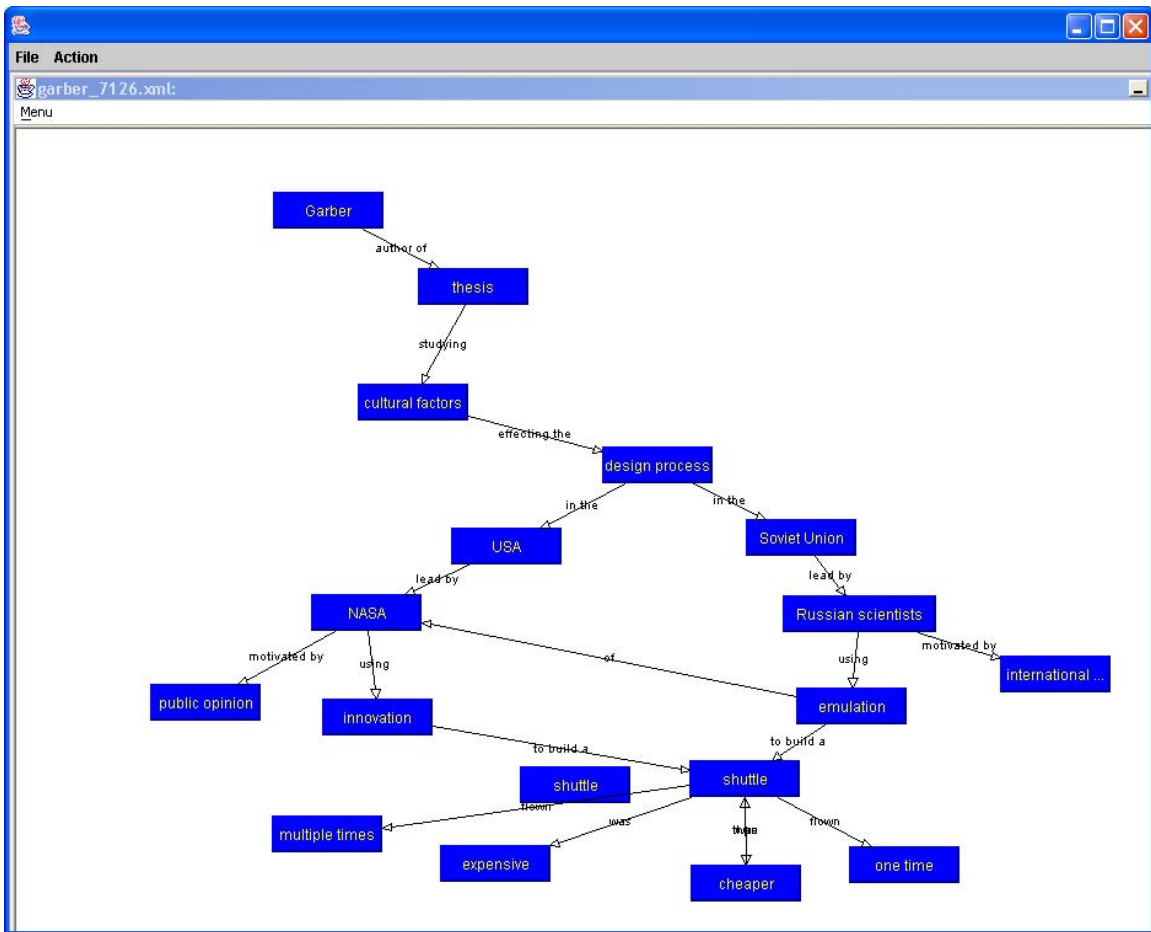
App. II. Figure 3: Concept map drawn for experiment 2, task 3.



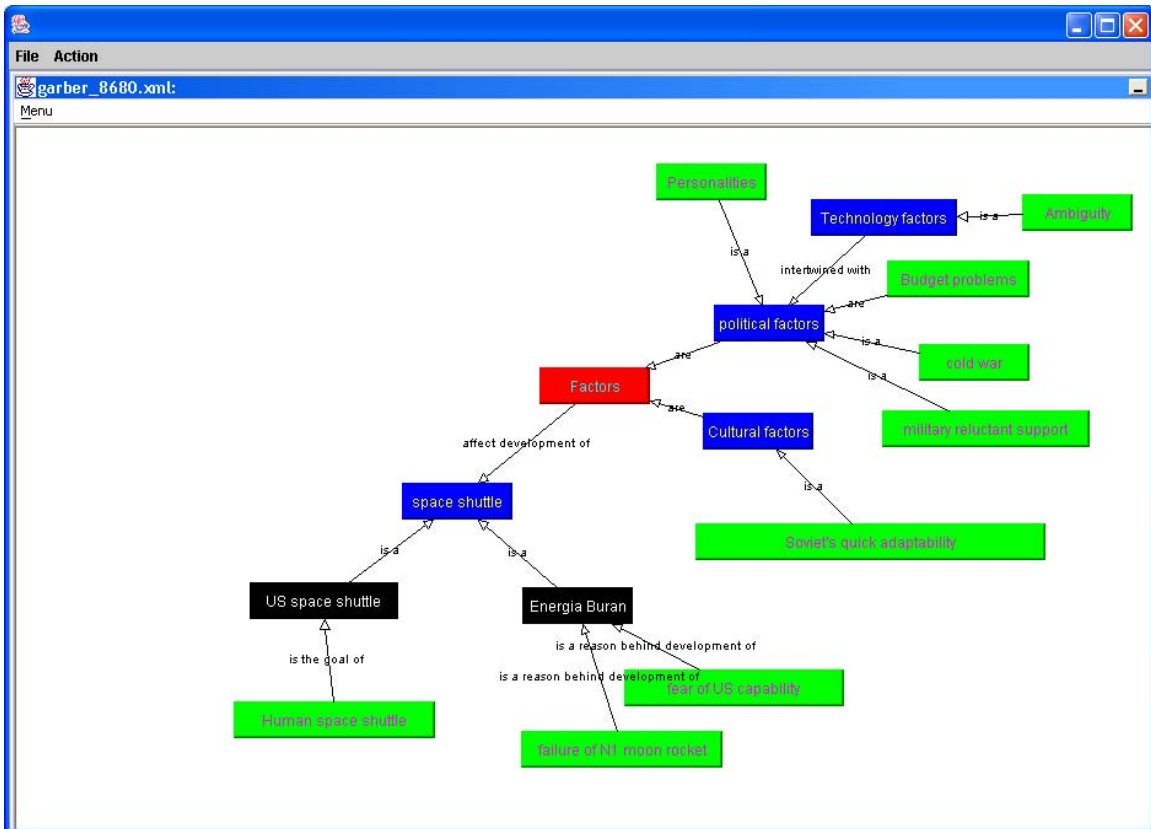
App. II. Figure 4: Concept map drawn for experiment 2, task 3.



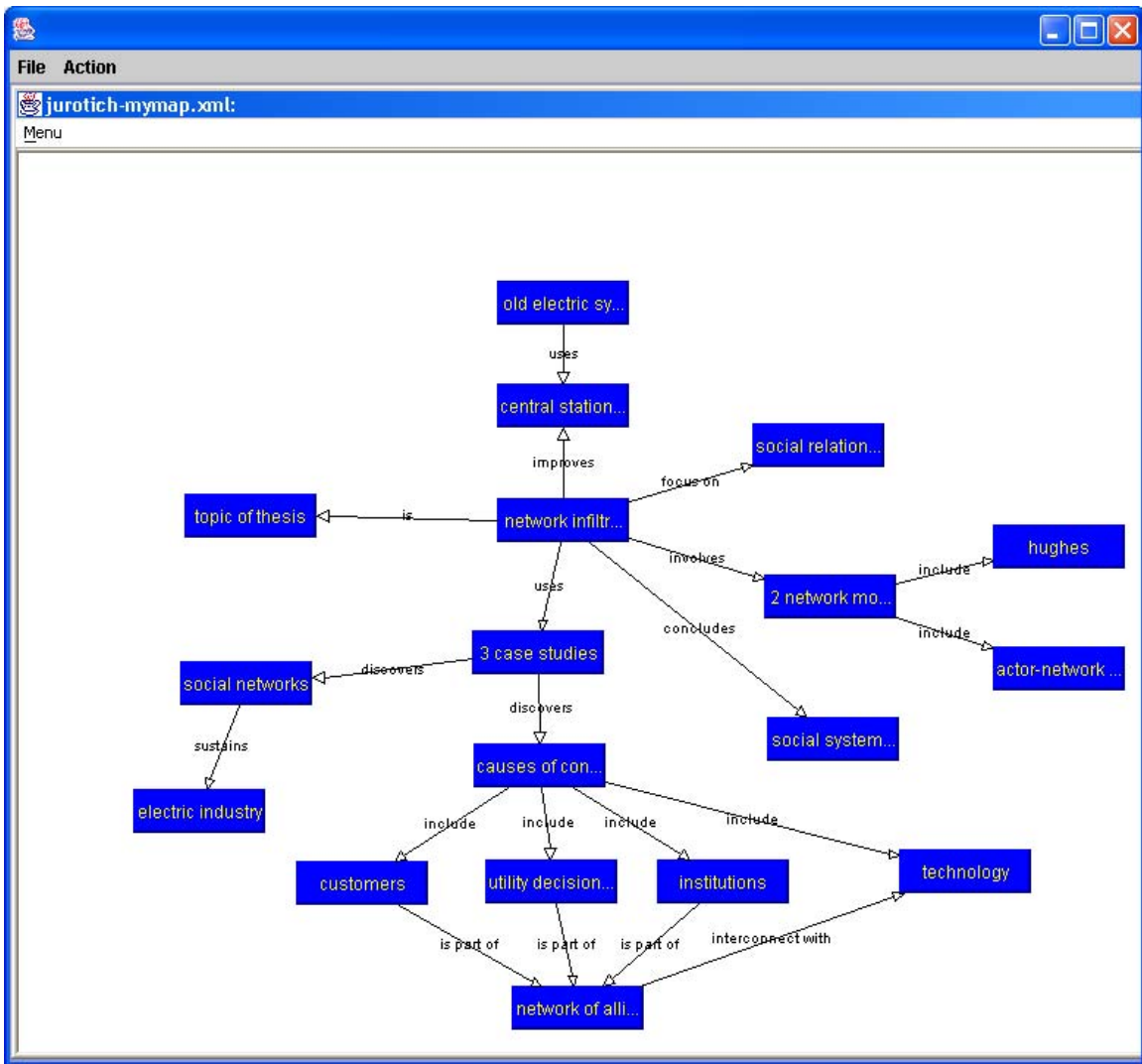
App. II. Figure 5: Concept map drawn for experiment 2, task 3.



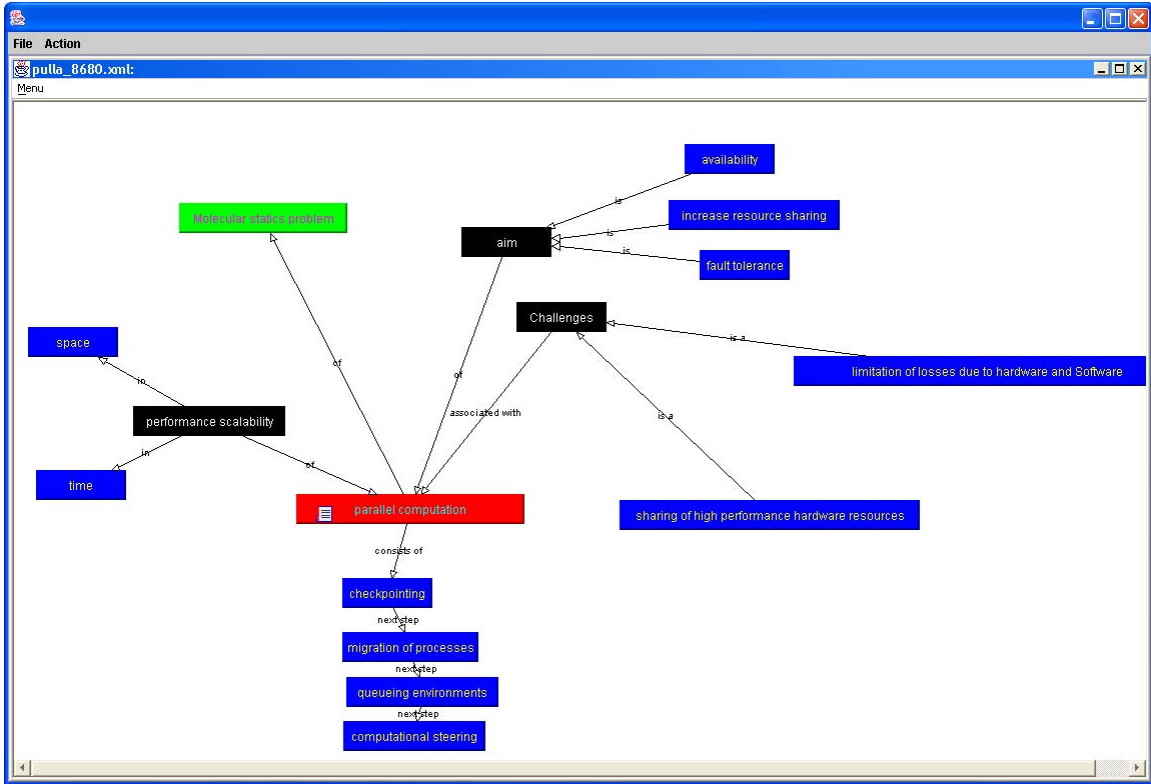
App. II. Figure 6: Concept map drawn for experiment 2, task 3.



App. II. Figure 7: Concept map drawn for experiment 2, task 3.



App. II. Figure 8: Concept map drawn for experiment 2, task 3.



App. II. Figure 9: Figure 9: Concept map drawn for experiment 2, task 3.

Task 4.

App. II. Table 1: Results of 5-point Likert scale questions.

Overall Results				
Concept Map Type	Node Selection	Link Selection	Relation Selection	Overall
Whole Document	2.5	2.6	2.0	1.9
Chap-by-Chap	2.1	2.5	1.7	1.9
Table of Contents	3.6	3.3	2.9	3.6

App. II. Table 2: Detailed results.

UserID	Thesis	Concept Sel - Whole	Link Sel-Whole	Relation Sel-Whole	Useful?-Whole
3682	Jurotich	1	2	2	2
8680	Pulla	2	2	1	1
1274	Christian	2	2	2	1
9790	Garber	2	2	2	2
9790	Christian	2	2	2	2
8680	Garber	3	3	1	1
3682	Christian	3	2	1	1
7126	Garber	3	4	4	4
7126	Ergen	3	3	3	3
1274	Ergen	4	4	2	2
UserID	Thesis	Concept Sel - Chap	Link Sel-Chap	Relation Sel-Chap	Useful?-Chap
3682	Jurotich	2	2	1	1
8680	Pulla	2	2	1	1
1274	Christian	4	4	3	2
9790	Garber	2	2	2	2
9790	Christian	2	2	2	2
8680	Garber	3	3	1	1
3682	Christian	1	2	1	1
7126	Garber	2	2	2	3
7126	Ergen	1	2	2	2
1274	Ergen	2	4	2	4
UserID	Thesis	Concept Sel - ToC	Link Sel-ToC	Relation Sel-ToC	Useful?-ToC
3682	Jurotich	4	3	3	4
8680	Pulla	4	4	No Response	4
1274	Christian	4	4	4	4
9790	Garber	3	1	2	3
9790	Christian	3	2	3	3
8680	Garber	5	4	4	4
3682	Christian	3	3	3	3
7126	Garber	3	4	3	3
7126	Ergen	4	4	3	4
1274	Ergen	3	4	4	4