The SINTEC Personalized, Knowledge-Based E-Learning Environment

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Knowledge-Based e-Learning

- Knowledge based systems
- Student modeling
- Reasoning for:
  - Student diagnosis
  - Explanations generation
  - Lesson planning
- Intelligent interfaces

Knowledge

Learning is a knowledge centered activity:

- One of the main goals of a learning process is the articulation in the learner's mind of a body of knowledge for the considered domain.
- The skeleton of this body is usually a semantic network of the main concepts involved in that domain - **ONTOLOGY**

Ontologies

"An ontology is a specification of a conceptualization....That is, an ontology is a description (like a formal specification of a program) of the concepts and relationships that can exist for an agent or a community of agents" (Gruber)

Ontologies used in e-Learning

- Domain
- Tutoring
- Human-computer interfacing
- Lexical
- Upper Level

Personalized texts for e-Learning

Are adapted to each users':

- knowledge - student model
- learning style
- psychological profile
- goals (e.g. lists of concepts to be learned)
- level (novice, expert)
- preferences (e.g. style of web pages)
- context of interaction

Student model

- Keeps track of the concepts known, unknown or wrongly known by the student (Dimitrova, Self, Brna, 2000)
- Inferred from results at tests or from interaction (visited web pages, topics searched etc.)
- Is usually defined in relation with the domain ontology (concept net, Bayesian net)

Intelligent e-Learning Projects at CS-Polytechnic University & ICIA

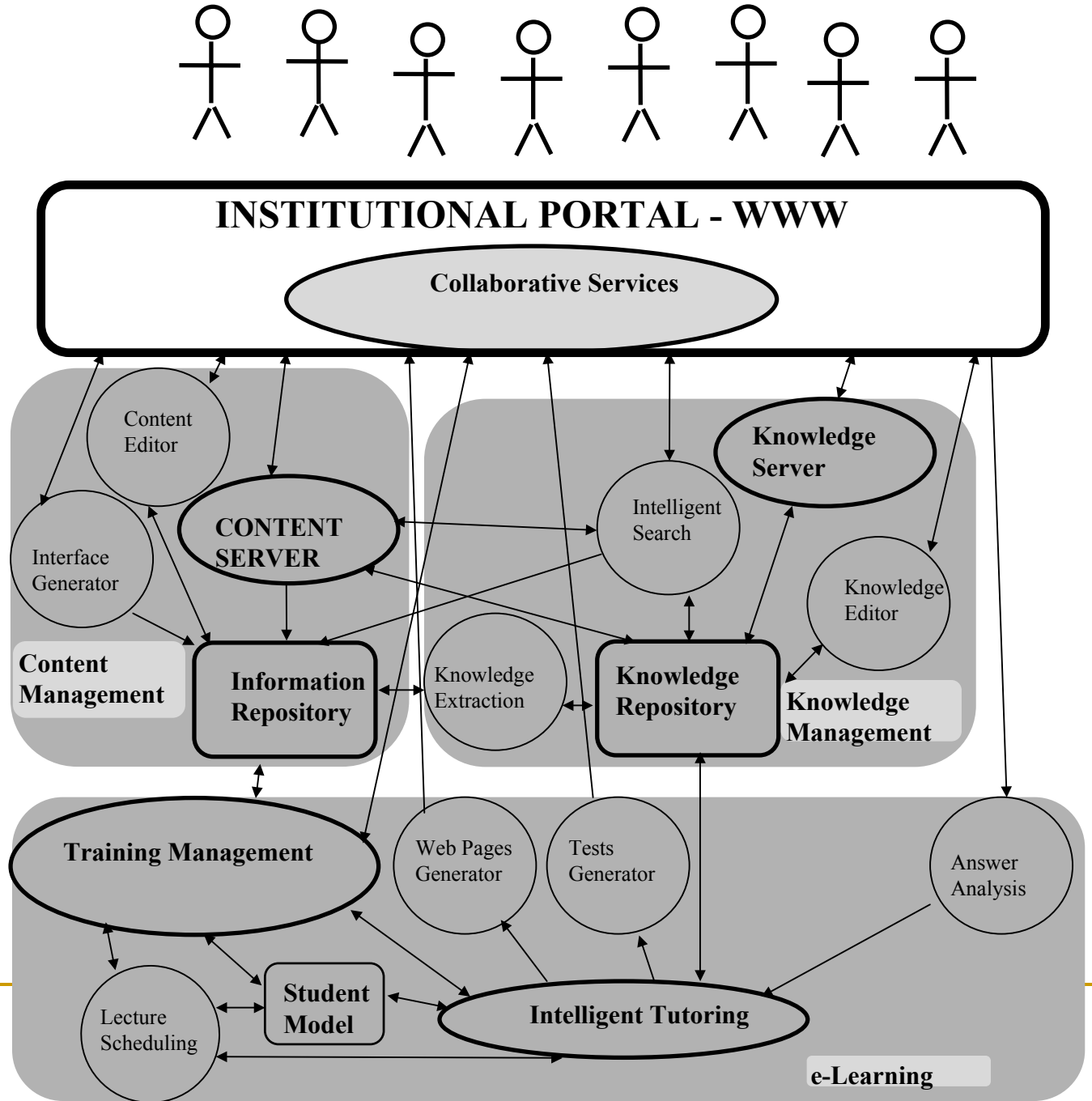
- MacPAIL
- ITS for programming
- WebGen
- LARFLAST
- SINTEC
- EU-NCIT
- COOPER

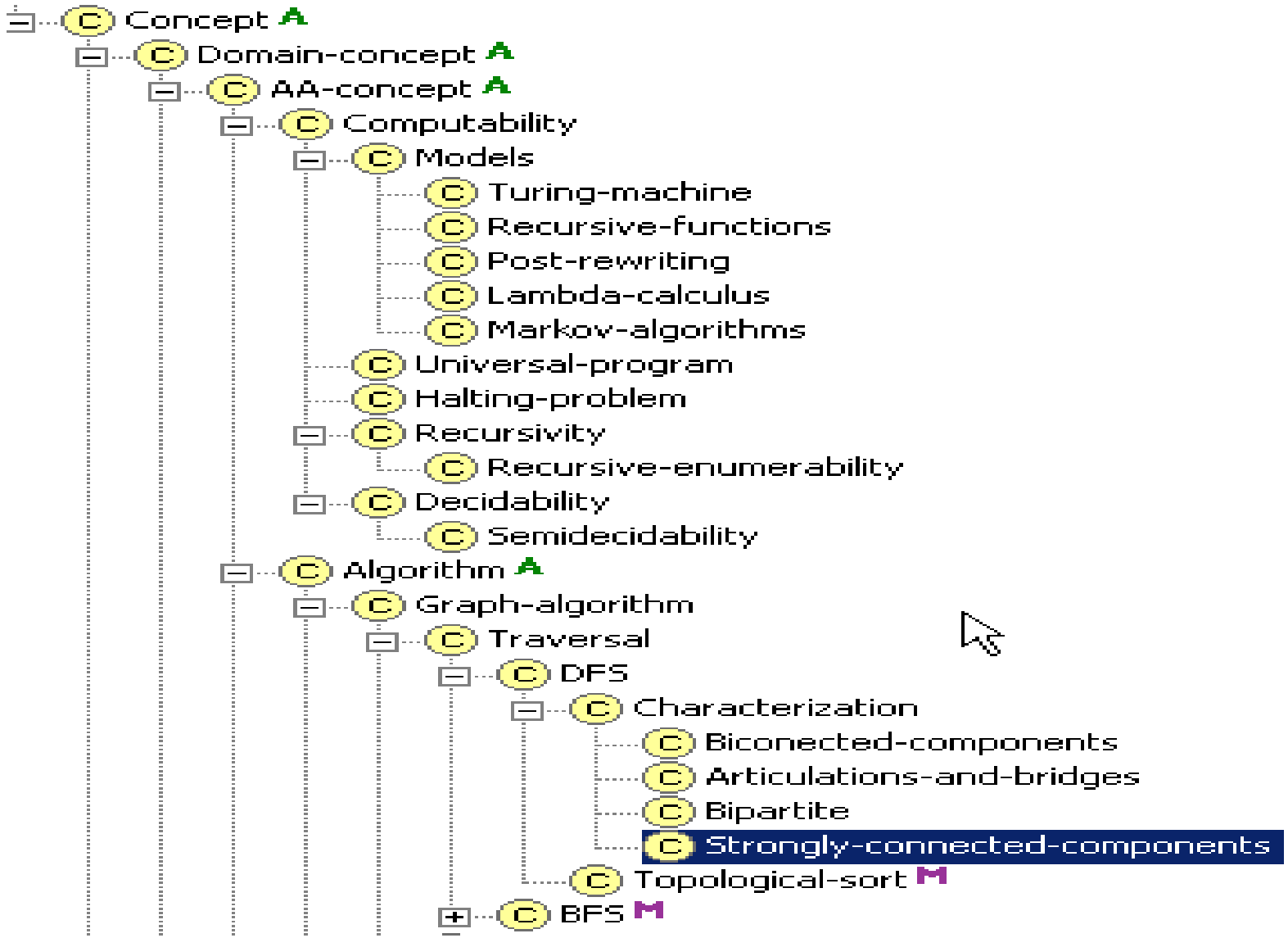
SINTEC (2002-2003)

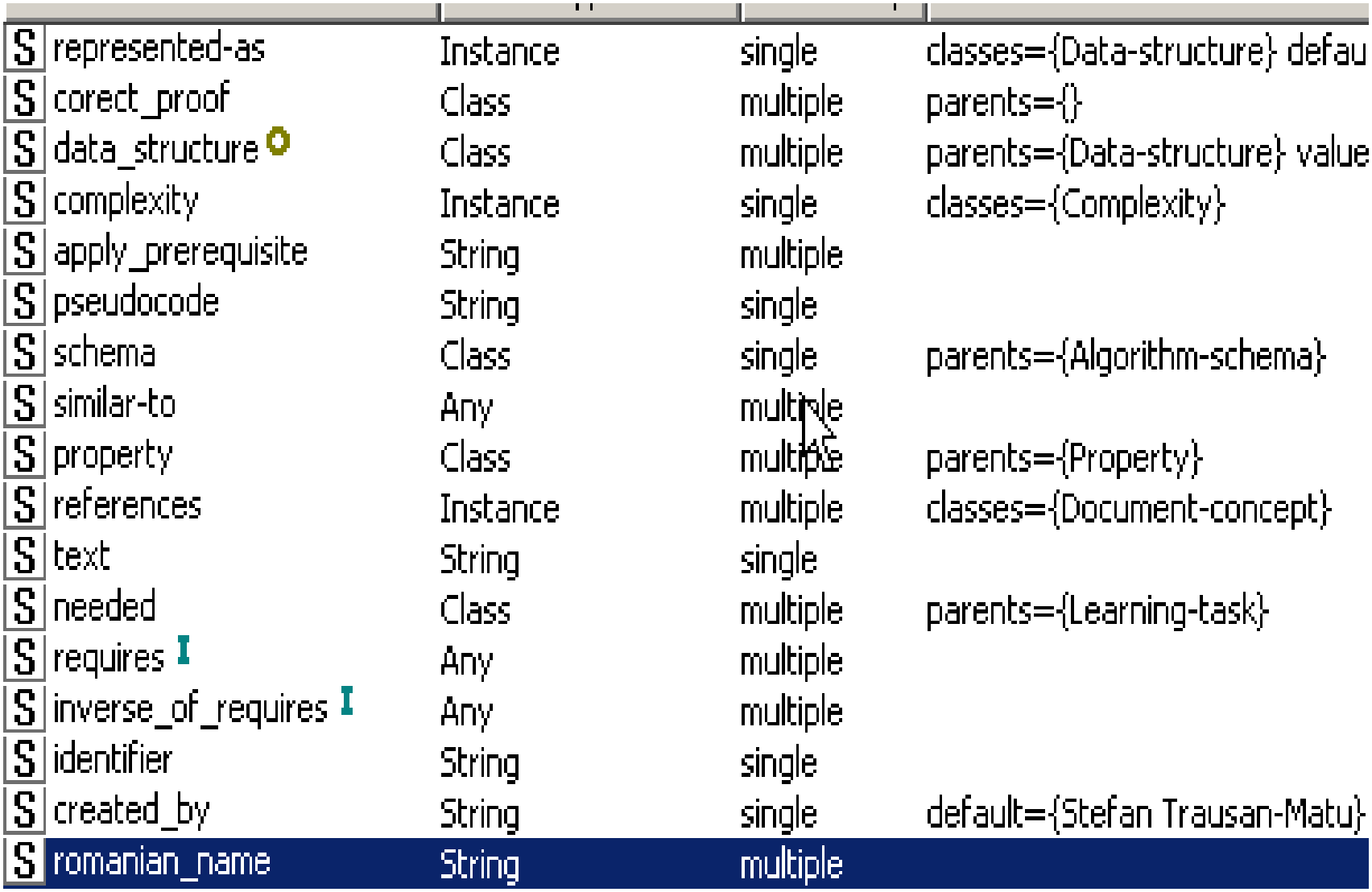
- INFOSOC- Funded Project
- Includes experience from ITS and LARFLAST
- Partners :
  - CS Dept., “Polytechnica” Univ. Bucharest
  - Romanian Academy Institute for AI
  - Romanian Academy Psychology Institute
  - SIVECO S.A. Romania
- Continued in FP6 SSA EU-NCIT

SINTEC

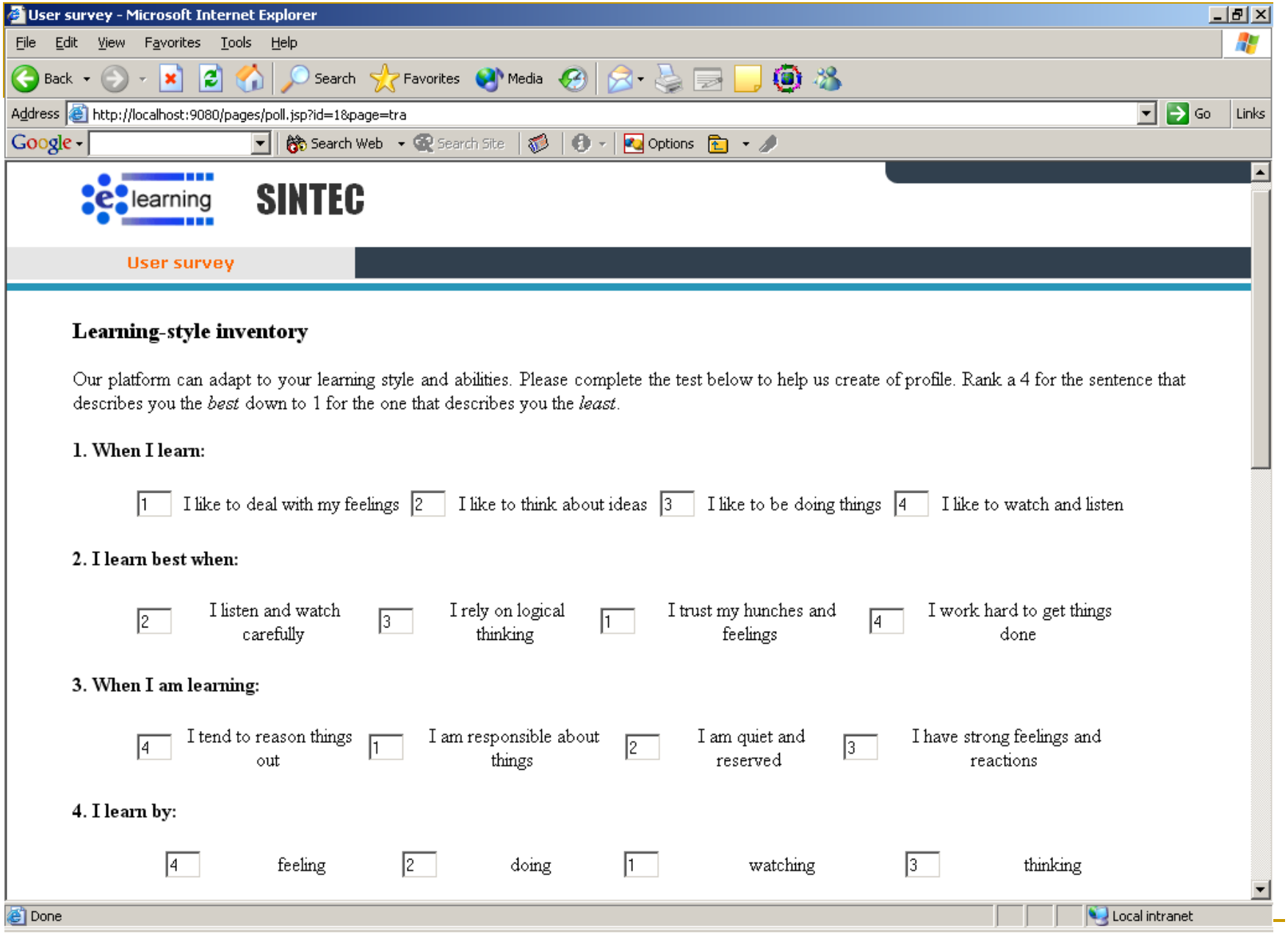
- Collaborative tools for distance and distributed e-Learning
- Web services technology for distributed processing knowledge (ontologies) from the (Semantic) Web
- Content creation and reuse from the web, according to metadata standards for e-Learning like IMS, ARIADNE, SCORM, AICC
- ITS technology (student modelling and inference)
- Text Mining:
  - intelligent search of learning materials on the web
  - knowledge extraction
  - categorization
  - summarization


INSTITUTIONAL PORTAL - WWW
Collaborative Services
Content Editor
CONTENT SERVER
Interface Generator
Content Management
Information Repository
Knowledge Server
Intelligent Search
Knowledge Editor
Knowledge Extraction
Knowledge Repository
Knowledge Management
Training Management
Web Pages Generator
Tests Generator
Answer Analysis
Lecture Scheduling
Student Model
Intelligent Tutoring
e-Learning


Concept A
Domain-concept A
AA-concept A
Computability
Models
Turing-machine
Recursive-functions
Post-rewriting
Lambda-calculus
Markov-algorithms
Universal-program
Halting-problem
Recursivity
Recursive-enumerability
Decidability
Semidecidability
Algorithm A
Graph-algorithm
Traversal
DFS
Characterization
Biconected-components
Articulations-and-bridges
Bipartite
Strongly-connected-components
Topological-sort M
BFS M



represented-as	Instance	single	classes={Data-structure} defau
corect_proof	Class	multiple	parents={}
data_structure	Class	multiple	parents={Data-structure} value
complexity	Instance	single	classes={Complexity}
apply_prerequisite	String	multiple	
pseudocode	String	single	
schema	Class	single	parents={Algorithm-schema}
similar-to	Any	multiple	
property	Class	multiple	parents={Property}
references	Instance	multiple	classes={Document-concept}
text	String	single	
needed	Class	multiple	parents={Learning-task}
requires	Any	multiple	
inverse_of_requires	Any	multiple	
identifier	String	single	
created_by	String	single	default={Stefan Trausan-Matu}
romanian_name	String	multiple	


User survey - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://localhost:9080/pages/poll.jsp?id=1&page=tra
Go Links
Google Search Web Search Site Options
learning
SINTEC
User survey
Learning-style inventory
Our platform can adapt to your learning style and abilities. Please complete the test below to help us create of profile. Rank a 4 for the sentence that describes you the best down to 1 for the one that describes you the least.
1. When I learn:
1 I like to deal with my feelings
2 I like to think about ideas
3 I like to be doing things
4 I like to watch and listen
2. I learn best when:
2 I listen and watch carefully
3 I rely on logical thinking
1 I trust my hunches and feelings
4 I work hard to get things done
3. When I am learning:
4 I tend to reason things out
1 I am responsible about things
2 I am quiet and reserved
3 I have strong feelings and reactions
4. I learn by:
4 feeling
2 doing
1 watching
3 thinking
Done
Local intranet


User's main page - Microsoft Internet Explorer
learning
SINTEC
User main page
What new? SINTEC Documentation Links
Tips & Hints
Check your forums and news often. New messages are posted on a daily basis.
Difficulties navigating the SINTEC website? Consult our manuals
Quick links
My documents
Welcome to SINTEC, Mr. Octavian Udrea. This is the main page of the application where you can access all resources made available by the SINTEC application. Please select an option from below...
Communication central
My messages
My discussion lists
My chatrooms
My briefcase
My notes
My documents
My links
Account details
You are currently logged as Mr. Octavian Udrea
Last login: 2003-12-09
Edit profile Logout
News
05/05/08 The SINTEC platform is undergoing the final testing stages of WCIT. Starting from December, it should ... more
05/05/08 The deadline for the AA.31.B Activity: Uses of topological sort in the Algo ... more
Done
Local intranet


Course: Algorithm Analysis (#31) - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://localhost:9000/pages/course.jsp
Google Search Web Options
learning
SINTEC
Course: Algorithm Analysis
What now? SINTEC Documentation Links
Tips & Hints
Check your forums and news often. New messages are posted on a daily basis.
Difficulties navigating the SINTEC website? Consult our manuals
Quick links
My documents
You are enrolled in the Algorithm Analysis (#31) since Sunday, November 2 2003.
Course details
Description: Introduction to fundamental algorithms and computation issues. Direct application into graphs, trees, network flow algorithms.
Instructor: Prof. Stefan Trausan Matu
Teaching Assistants: Ruxandara Ibacu
Grading information: Maximum grade is 10. Minimum passing grade is 5. Maximum points available: 110.
Communication central
Forum: AA discussion list
Chatroom: AA chat
Discussion transcript available for AA chat for Thursday, December 4 2003: click here.
Scheduled events
Recitation scheduled for Thursday, December 18 2003 at 11:00 GMT+2.
This event repeats for the following period: every week.
My activity
You have currently completed 34% of the activities. You have currently 58 points out of 60.
Your discussion participation details: 2 messages posted.
Work on activities Notes for this course
Account details
You are currently logged as Mr. Octavian Udrea
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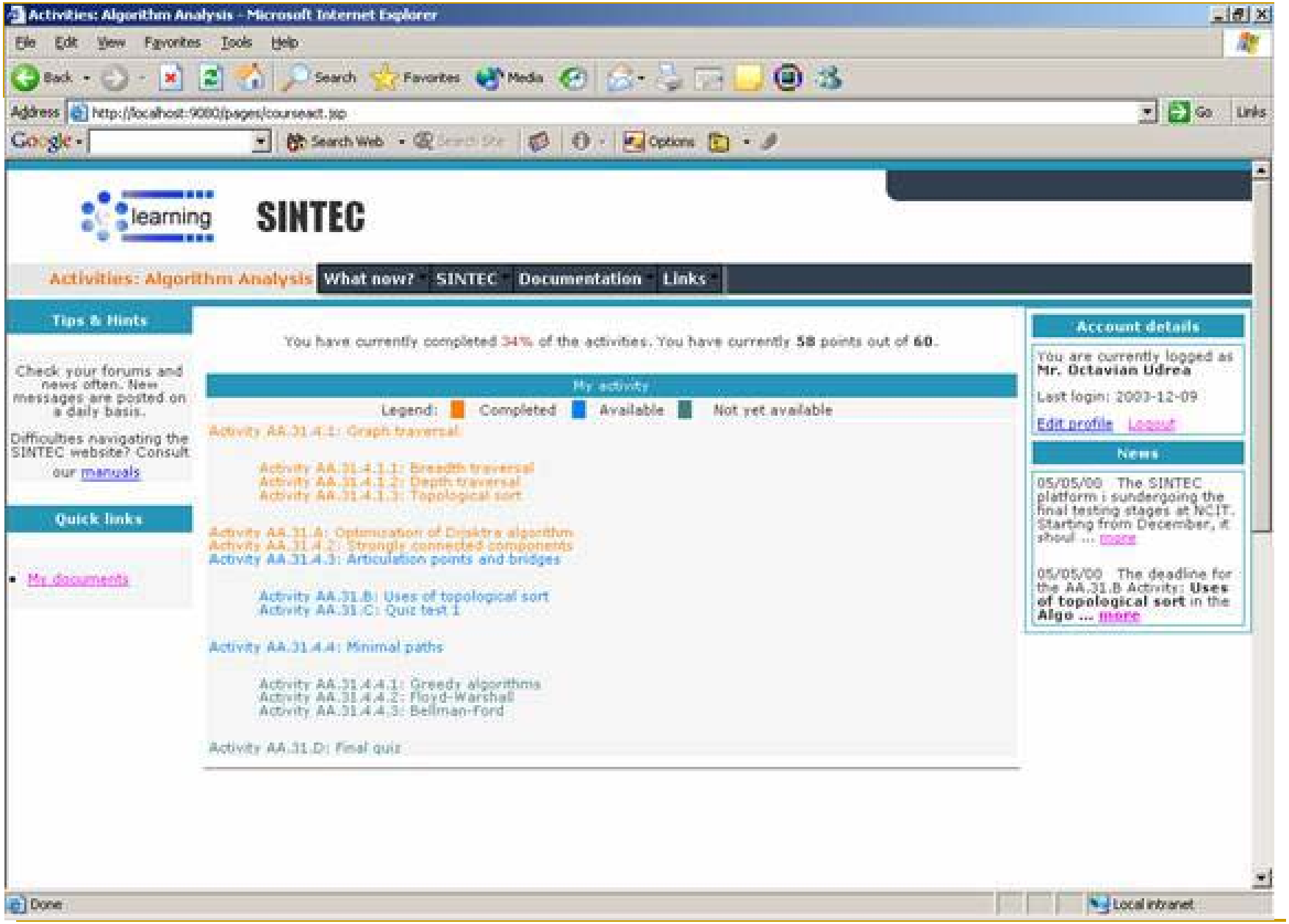
05/05/03 The SINTEC platform i sundergoing the final testing stages at NCIT. Starting from December, it shoul ... more
05/05/03 The deadline for the AA.31.B Activity: Uses of topological sort in the Algo ... more
© 2003 NCIT
This site is best viewed with Microsoft Internet Explorer
Done
Local intranet


Activities: Algorithm Analysis - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://localhost:9080/pages/courseact.jsp
Go Links
Search Web Options
learning
SINTEC
Activities: Algorithm Analysis
What now?
SINTEC
Documentation
Links
Tips & Hints
Check your forums and news often. New messages are posted on a daily basis.
Difficulties navigating the SINTEC website? Consult our manuals
Quick links
My documents
You have currently completed 34% of the activities. You have currently 58 points out of 60.
My activity
Legend: Completed Available Not yet available
Activity AA.31.4.1: Graph traversal
Activity AA.31.4.1.1: Breadth traversal
Activity AA.31.4.1.2: Depth traversal
Activity AA.31.4.1.3: Topological sort
Activity AA.31.A: Optimization of Dijkstra algorithm
Activity AA.31.4.2: Strongly connected components
Activity AA.31.4.3: Articulation points and bridges
Activity AA.31.B: Uses of topological sort
Activity AA.31.C: Quiz test 1
Activity AA.31.4.4: Minimal paths
Activity AA.31.4.4.1: Greedy algorithms
Activity AA.31.4.4.2: Floyd-Warshall
Activity AA.31.4.4.3: Bellman-Ford
Activity AA.31.D: Final quiz
Account details
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News
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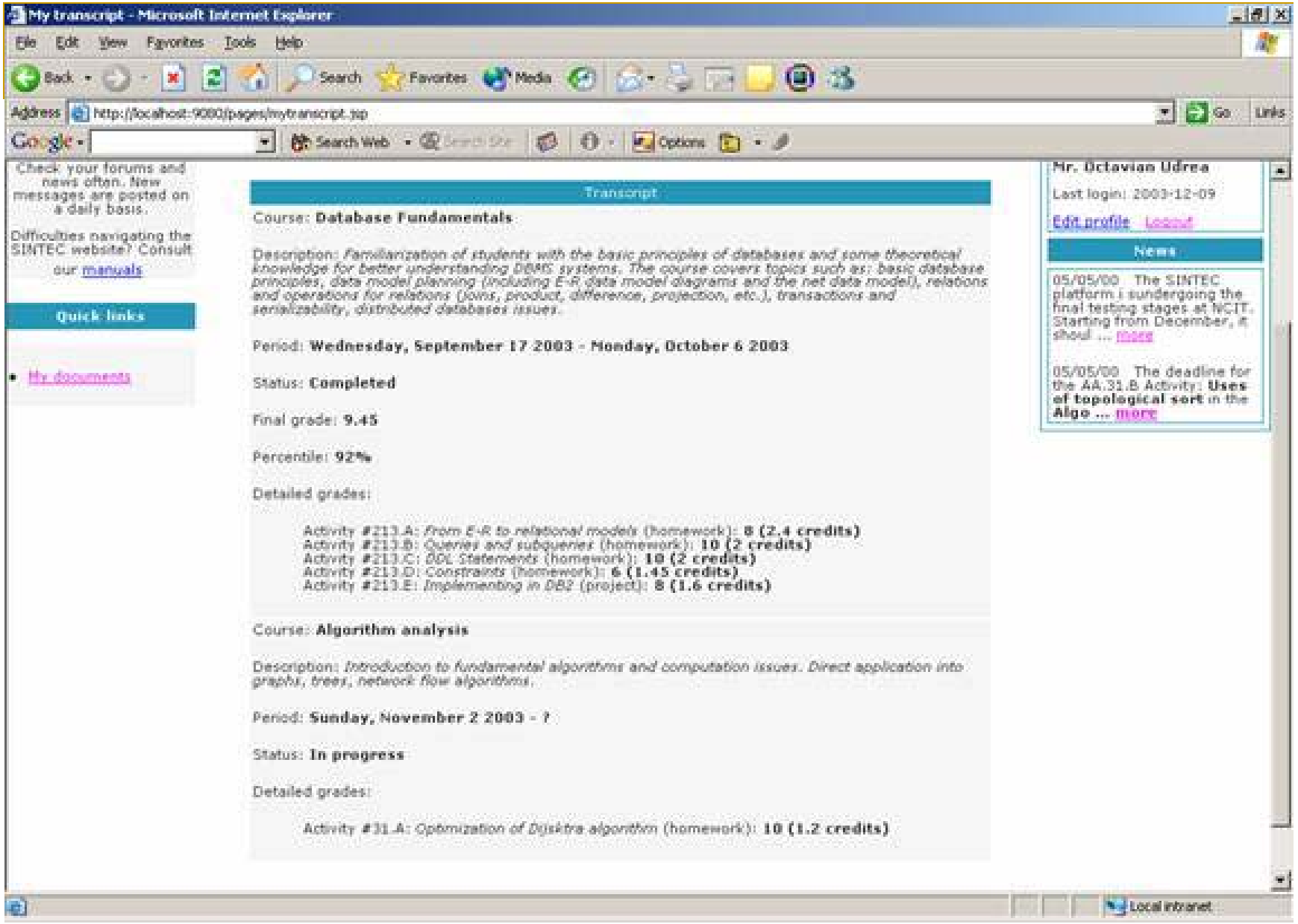
Done
Local intranet


My transcript - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://localhost:9080/pages/mytranscript.jsp
Go Links
Google Search Web Options
Check your forums and news often. New messages are posted on a daily basis.
Difficulties navigating the SINTEC website? Consult our manuals
Quick links
My documents
Transcript
Course: Database Fundamentals
Description: Familiarization of students with the basic principles of databases and some theoretical knowledge for better understanding DBMS systems. The course covers topics such as: basic database principles, data model planning (including E-R data model diagrams and the net data model), relations and operations for relations (joins, product, difference, projection, etc.), transactions and serializability, distributed databases issues.
Period: Wednesday, September 17 2003 - Monday, October 6 2003
Status: Completed
Final grade: 9.45
Percentile: 92%
Detailed grades:
Activity #213.A: From E-R to relational models (homework): 8 (2.4 credits)
Activity #213.B: Queries and subqueries (homework): 10 (2 credits)
Activity #213.C: DDL Statements (homework): 10 (2 credits)
Activity #213.D: Constraints (homework): 6 (1.45 credits)
Activity #213.E: Implementing in DB2 (project): 8 (1.6 credits)
Course: Algorithm analysis
Description: Introduction to fundamental algorithms and computation issues. Direct application into graphs, trees, network flow algorithms.
Period: Sunday, November 2 2003 - ?
Status: In progress
Detailed grades:
Activity #31.A: Optimization of Dijkstra algorithm (homework): 10 (1.2 credits)
Mr. Octavian Udrea
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05/05/00 The deadline for the AA.31.B Activity: Uses of topological sort in the Algo ... more
Local intranet

Conclusions

- The approach was used for CS students at PUB
- Algernon is not reliable – in future JESS
- A lot of psychology work to be done
- Difficult to develop the ontology