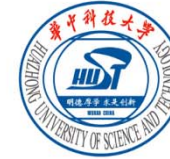




Huazhong University of
Science and Technology



華中科技大學

Intelligence and Security Driven Distributed Systems

Ruixuan Li

Huazhong University of Science and Technology
Wuhan, China

<http://idc.hust.edu.cn/~rxli/>





HUST in China



Top 10 in China: 6(2002), 5(2003, 2004), 6(2005), 7(2006, 2007), 8(2008), 9(2009)



CS at HUST

- College of Computer Science and Technology
- **4** departments
 - Computer Science
 - Computer Engineering
 - Computer Application
 - Information Security
- **184** faculty, 30+ staff
- Top 10 of CS in China
 - **9** (2006)



IDC-Lab at HUST

Intelligent and Distributed
Computing Lab



14 Faculty:

3 full professors

5 A/Profs

6 lectures

Over 70 PhDs & Masters



Relationship

- Universities
 - University of Illinois at Urbana-Champaign (Computer Vision)
 - University of College London (Watermarking)
 - University of Toronto (Distributed Systems)
 - Concordia University (Security)
 - George Mason University (Security)
 - Clemson University (P2P)
 - Queen's University Belfast (IR)
 - Macquarie University (Security)
 - University of Western Sydney (Logic)
 - City University of Hong Kong (Distributed Systems)
 - ...
- Industries
 - IBM, Microsoft, Oracle, SCO, Tencent, Netease, ...

Research Grants

- Grants in 2004-2009
 - 8 NSFC grants
 - 3 National Hi-Tech R&D Program of China (863) grants
 - 4 National Key Tech R&D Program of China grants
 - 3 grants from Ministry of Information Industry
 - Over 10 other grants from Ministry of Science and Technology, Hubei Province, Huawei Corp, etc
- Funding in 2004-2009: **over 10M RMB**
 - **3.5M** RMB in 2008



Research Output

- Publications

- Over **300** publications
- IEEE TKDE, IEICE Trans, Comp J, Info Sci, Comp Comm, IJSEKE, IJCSSE, IJPEDS, IJCNSS
- ACM MM, CVPR, ICPR, CIKM, ACM SAC, ICME, ICIP, ICTAI, ISC, DEXA, SCC
- Science in China, JCST

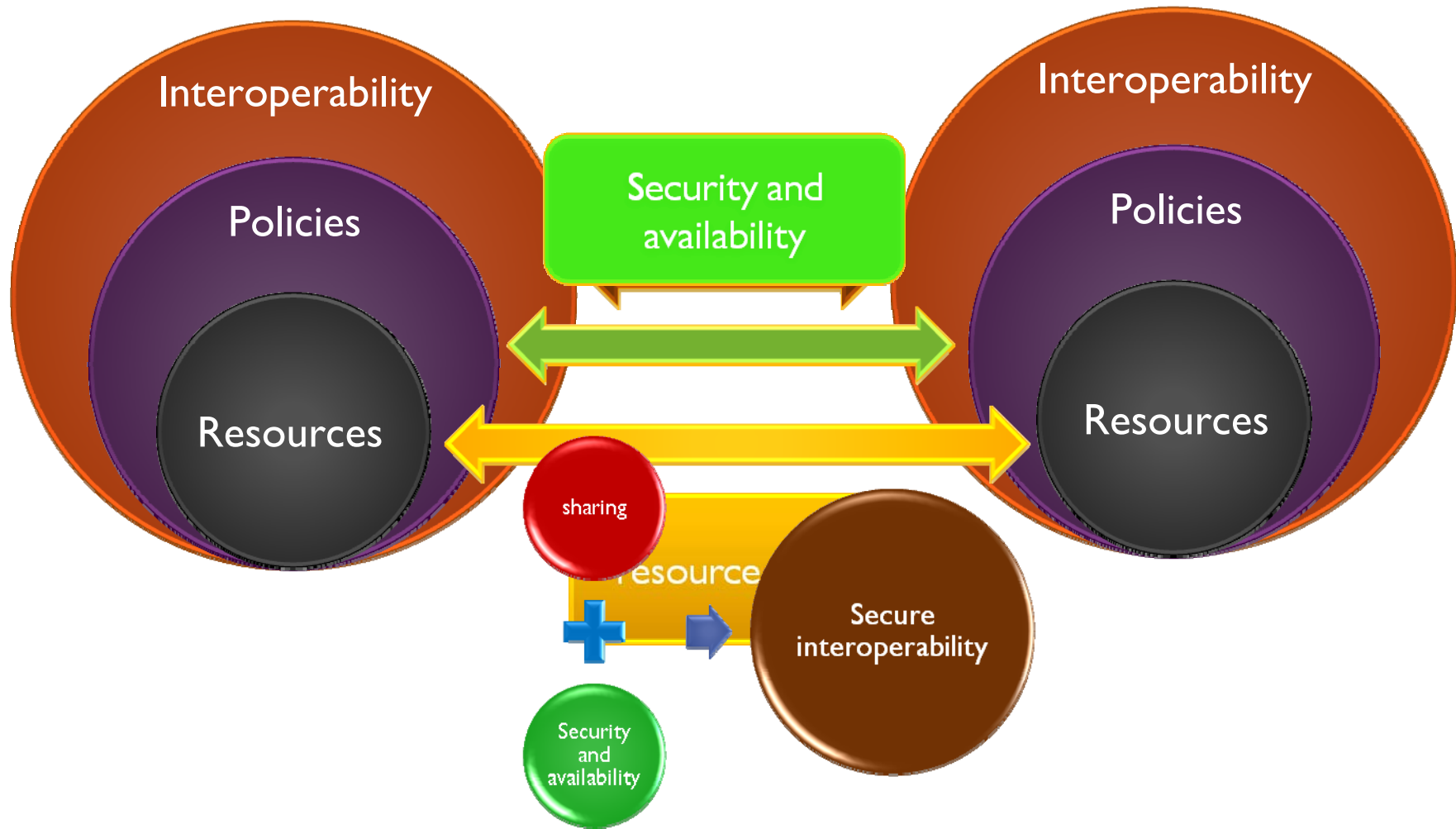
- Patents

- **18** patents (12 pending)

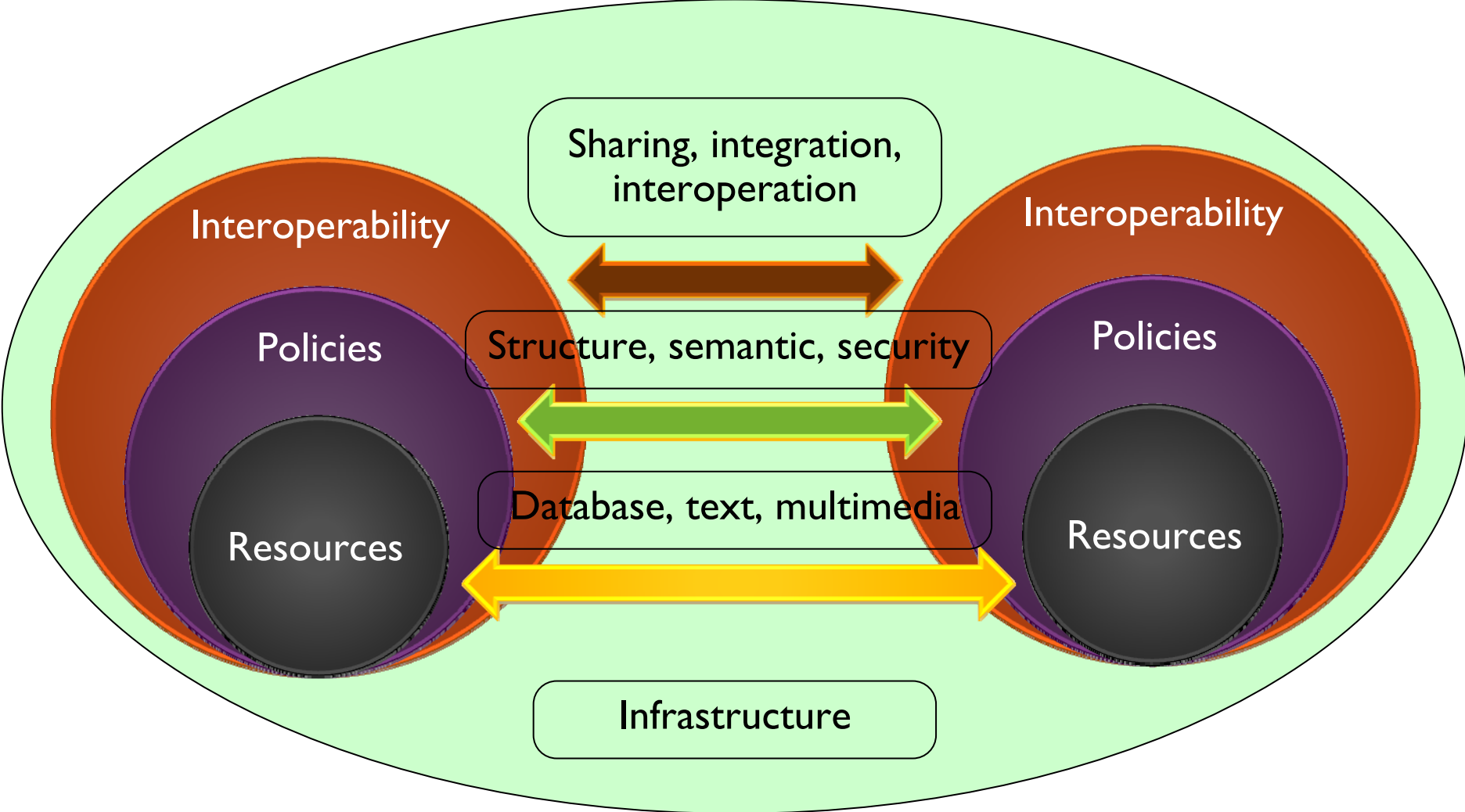
- Software copyrights

- **9** software copyrights

Research Fields



Research Fields





Research Fields

- Resource sharing in peer-to-peer network
- Semantic search
- Link analysis & link mining
- Secure interoperability in distributed systems
- Watermarking & DRM
- Intelligent multimedia

P2P Group



Key Issues

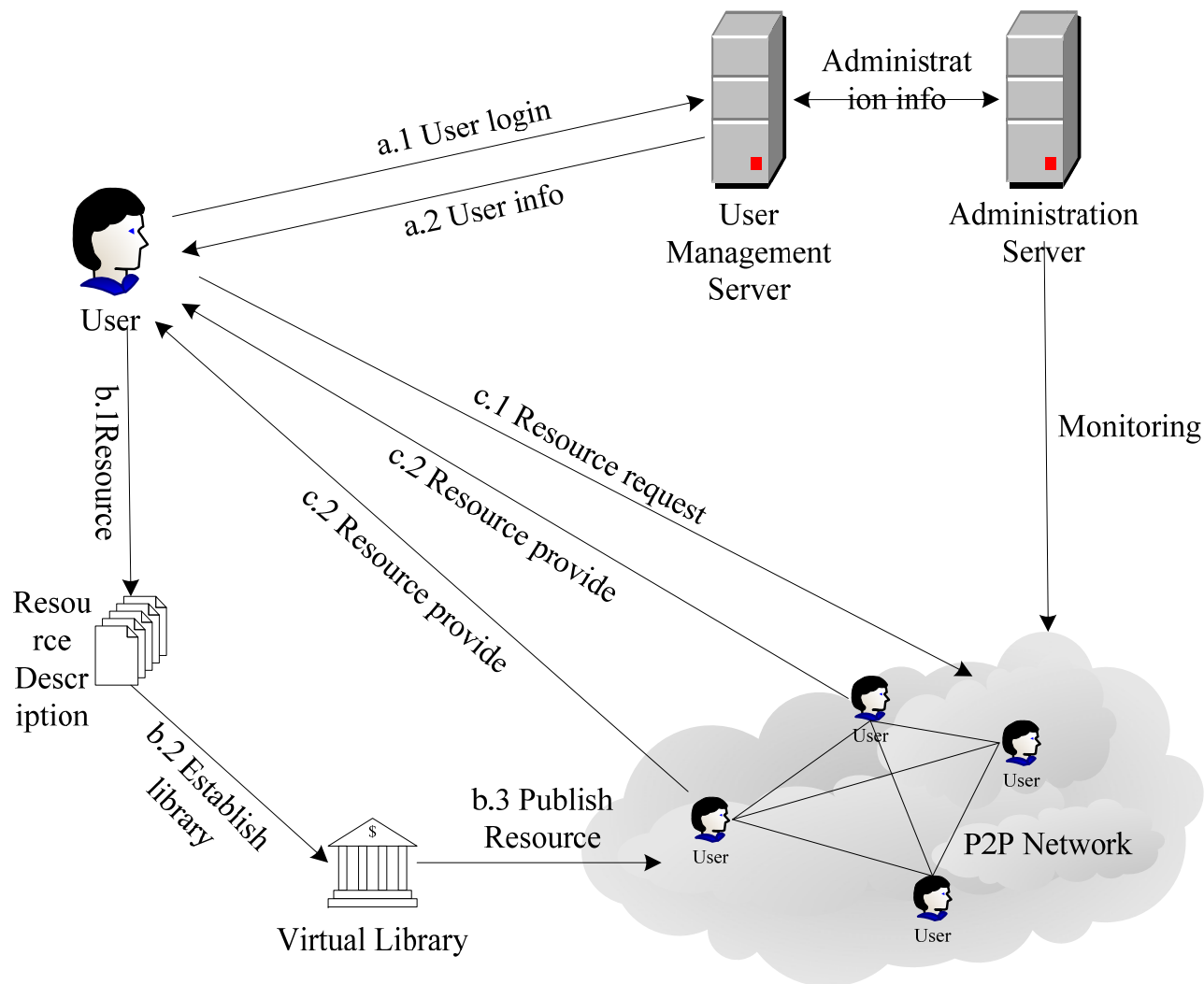
- Topology Maintenance
- Searching Scheme (Routing Protocol)
- Data Dissemination Scheme
- **Buffer Management**
- Security and Reputation



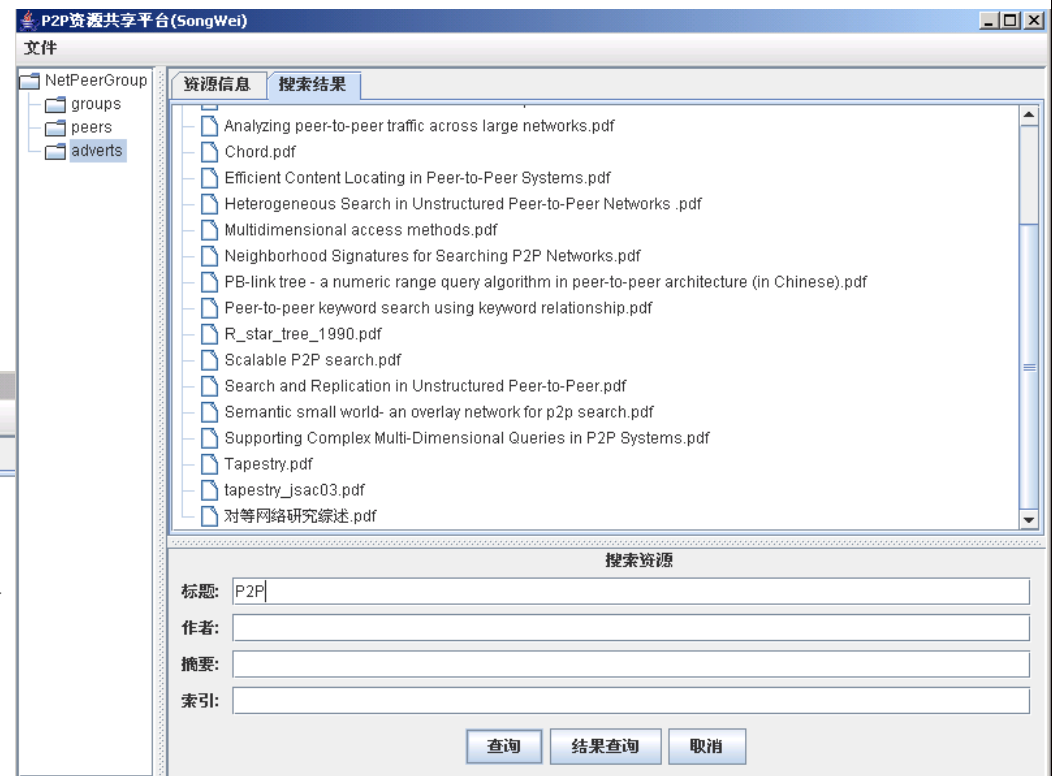
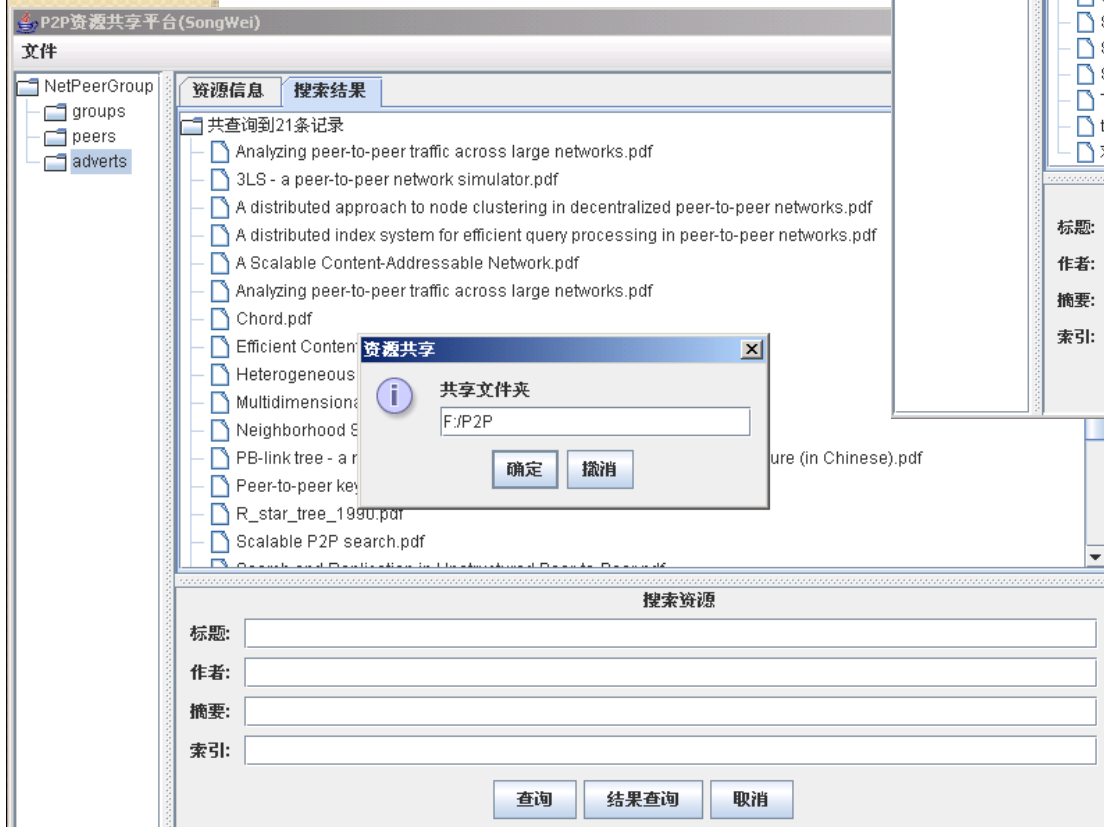
Our Experiences on P2P

- PeerLib
 - A P2P-based Digital Library
 - <http://idc.hust.edu.cn/peerlib/>
- WebPeer
 - A Web Services Oriented P2P System
 - <http://idc.hust.edu.cn/webpeer/>
- CoEdit
 - A P2P Based Collaborative Editing System
 - <http://idc.hust.edu.cn/coedit/>

PeerLib Architecture



PeerLib Prototype





WebPeer: Motivation

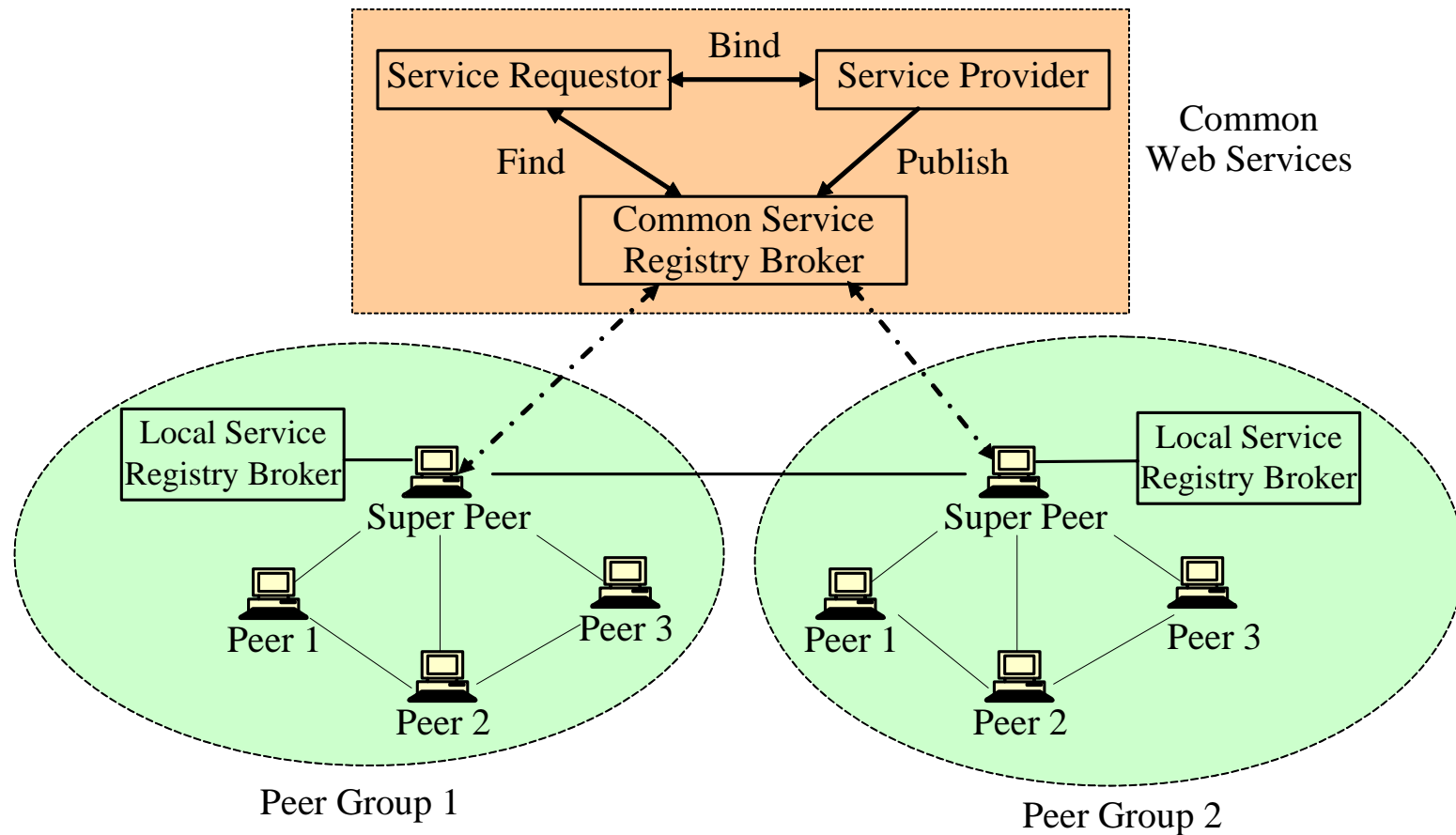
- Disadvantages of Web Services
 - Single Node Failure
 - UDDI **Bottleneck**
 - Limited Scalability
 - Denial of Service (**DoS**) Attack
- Advantages of Peer-to-Peer
 - Sharing plentiful **resources** and **services** among network edges
 - Federated **cooperation** among companies
 - Having **Lower costs** of system maintenance
 - **Fault tolerance** & load balance



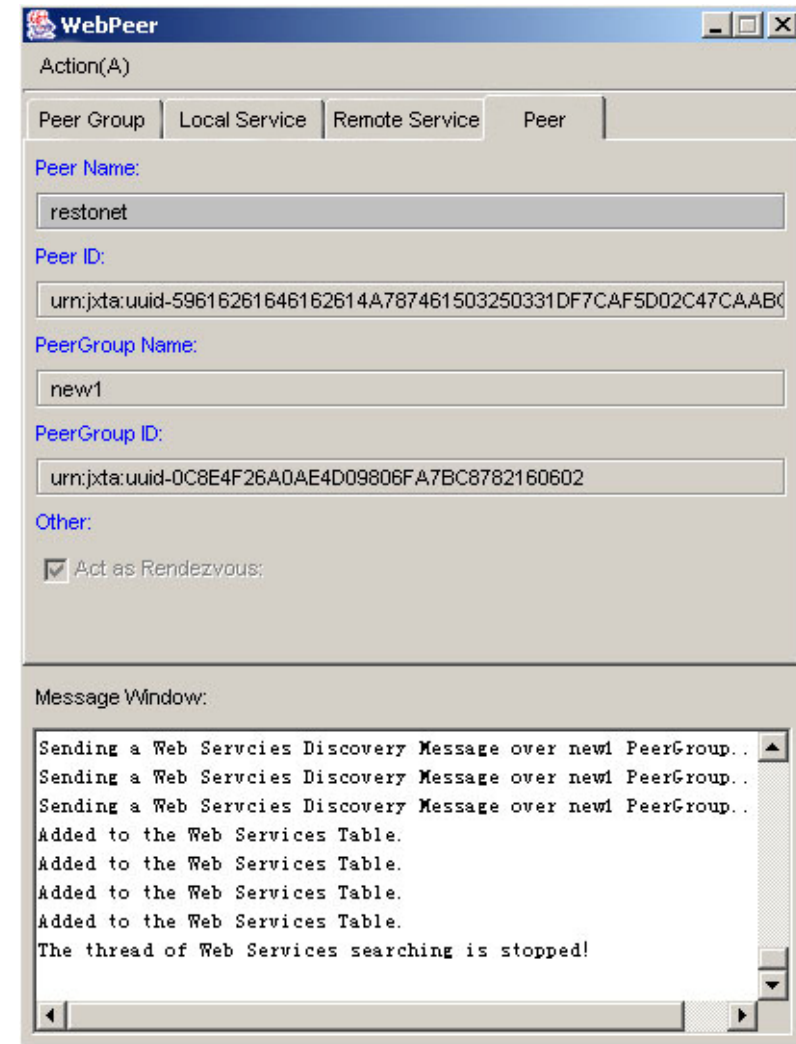
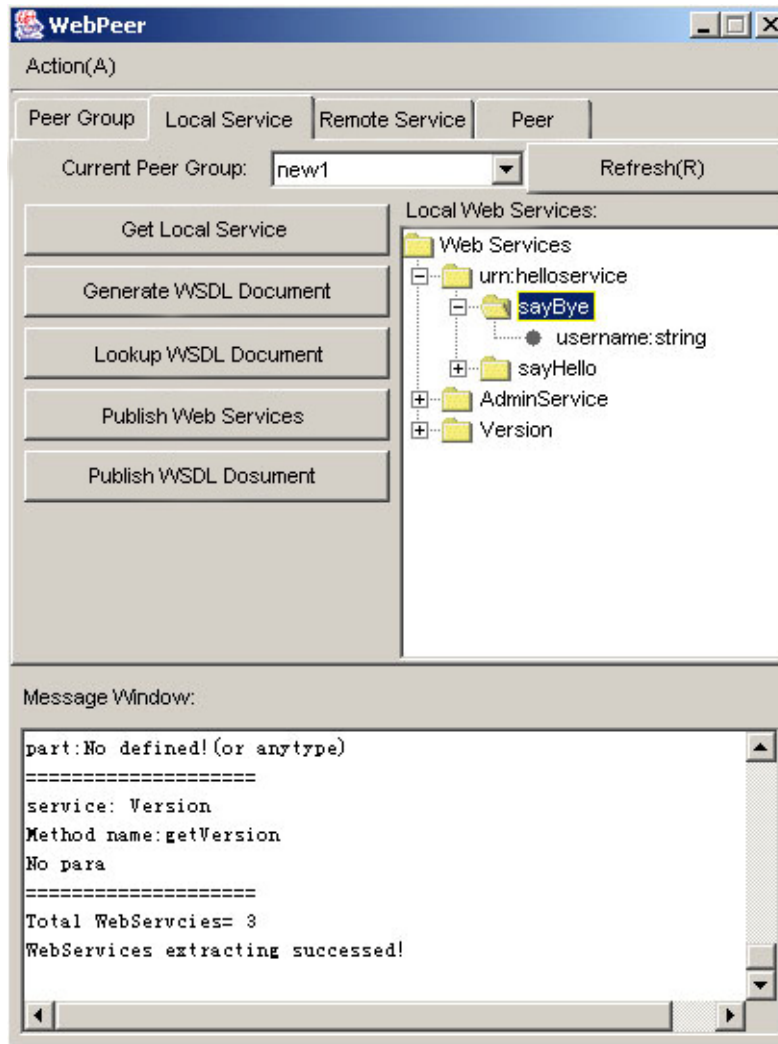
Combination of the Two Technologies

- Using P2P-based technologies to publish and discover Web Services
 - Combination of **centralized** and **decentralized** characteristics
 - The node **providing** web services act as a peer
 - Each peer can **request** web services from other peers
 - Extend the **reliability** and **scalability** of the current web services architecture

WSOP: Web Services Oriented Peer-to-peer Architecture

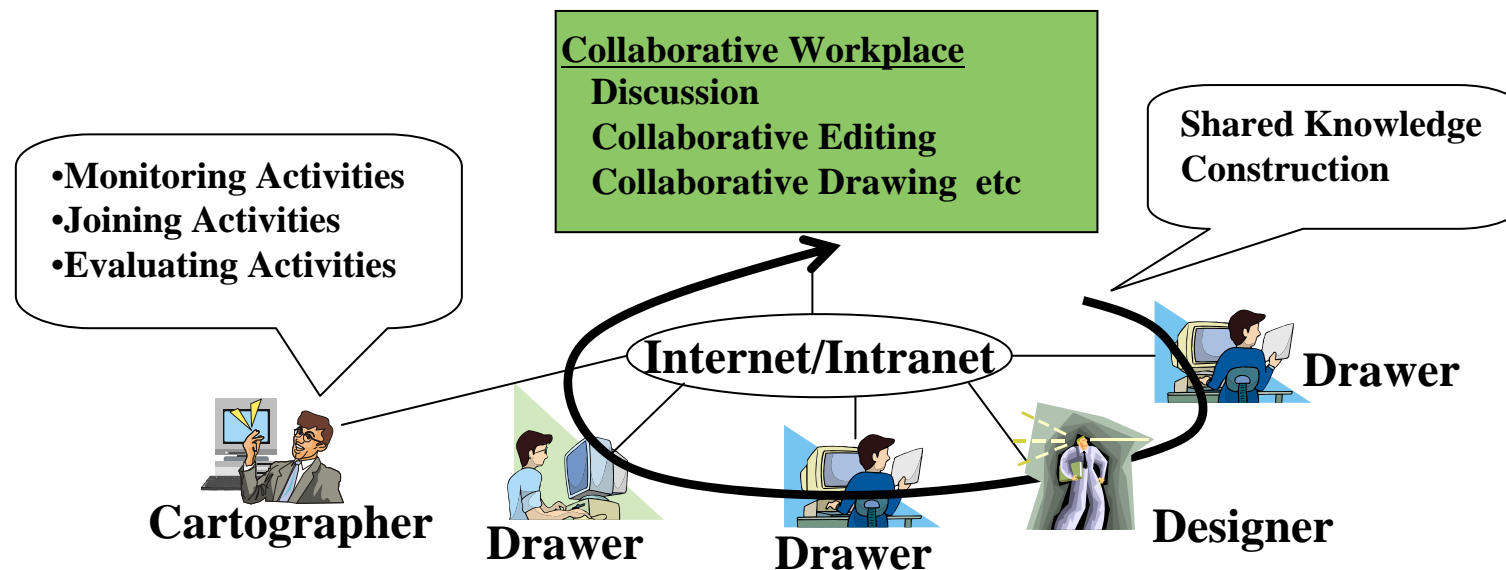


WebPeer: System Interfaces



CoEdit: Motivation

- **Collaborative Editing** is a form of Editing which involves a group editing process.
- **Scenario:** Cartographers, designers and drawers fulfill drawing objectives, through sharing resources, context and group interaction.





CoEdit: Issues

- **Session Management:** How do distributed users create, destroy, join and leave collaborative sessions?
- **Concurrency Control:** How do we ensure that concurrent users do not enter inconsistent commands, or merge concurrent commands entered by different users?
- **Undo/Redo:** What are the semantics of undo/redo in a collaborative session?
- **Awareness:** How are users made aware of “out of band” activities of their collaborator?
- **Access Control:** How do we ensure that users do not execute unauthorized commands?
- **Other Aspects:** ...



CoEdit: Our Approach

- Enhance the efficiency and performance through employing **P2P technology**
 - **Centralized** and **decentralized** architecture
 - **Direct communication** between collaborative sites
 - **Message routing** in the collaborative group
 - **Access control** among different peers



Grants of P2P Group

- Percolation-Based Topology Control and Search in Peer-to-Peer Network (Supported by [NSFC](#))
- Scale-Free Network Model in Semantic Overlay Network (Supported by [Chenguang Program of Wuhan Municipality](#))

Publications

- Ruixuan Li, Cuihua Zuo, Haiying Shen, Kunmei Wen, Xiwu Gu. PercolationNET: a Multi-tree P2P Overlay Network Supporting High Coverage Search. *International Journal of Parallel, Emergent & Distributed Systems*, 2009
- Cuihua Zuo, Ruixuan Li, Zhengding Lu. A Novel Approach to Improve the Security of P2P File-Sharing Systems. *International Journal of Communications, Network and System Sciences*, 2009, 2(3): 169-247
- Cuihua Zuo, Ruixuan Li, Haiying Shen, Zhengding Lu. High Coverage Search in Multi-Tree Based P2P Overlay Network. In: Proc. of IEEE *ICCCN 2009* Workshop, San Francisco, USA, 2009
- Ruixuan Li, Cuihua Zuo, Yuntian He, Zhengding Lu. A Credit Mechanism Based on Automatic Audit in P2P File Sharing Systems. In: Proc. of *TrustCom 2008*, Zhangjiajie, Hunan, China, 2008, pp. 2044-2049
- Wei Song, Ruixuan Li, Zhengding Lu, Mudar Sarem. SemSearch: A Scalable Semantic Resource Search Algorithm for Unstructured P2P Network. In: Proc. of *APWeb 2008*, LNCS 4976, Shenyang, China, 2008, pp. 631-636
- Wei Song, Ruixuan Li, Zhengding Lu, Guangcan Yu. FAN: A Flabellate Overlay Network Supporting Scalable Multi-Dimensional Attributes. In: Proc. of IEEE *AINA 2008*, GinoWan, Okinawa, Japan, March 2008, pp. 1005-1012
- Ruixuan Li, Guangcan Yu, Zhengding Lu, Wei Song. P2P-based Locking in Real-Time Collaborative Editing Systems. In: Proc. of *CSCWD 2007*, Melbourne, Australia, 2007, pp. 24-29
- Ruixuan Li, Zhi Zhang, Zhigang Wang, Wei Song, Zhengding Lu. WebPeer: A P2P-based System for Publishing and Discovering Web Services. In: IEEE *SCC 2005*, Orlando, Florida, 2005, pp. 149-156

Semantic Search Group



Research Issues

- Semantic search conceptual model
- Ontology knowledge construction, maintenance and evolution
- Reasoning mechanisms
- Result ranking



• Our Experiences on Semantic Search

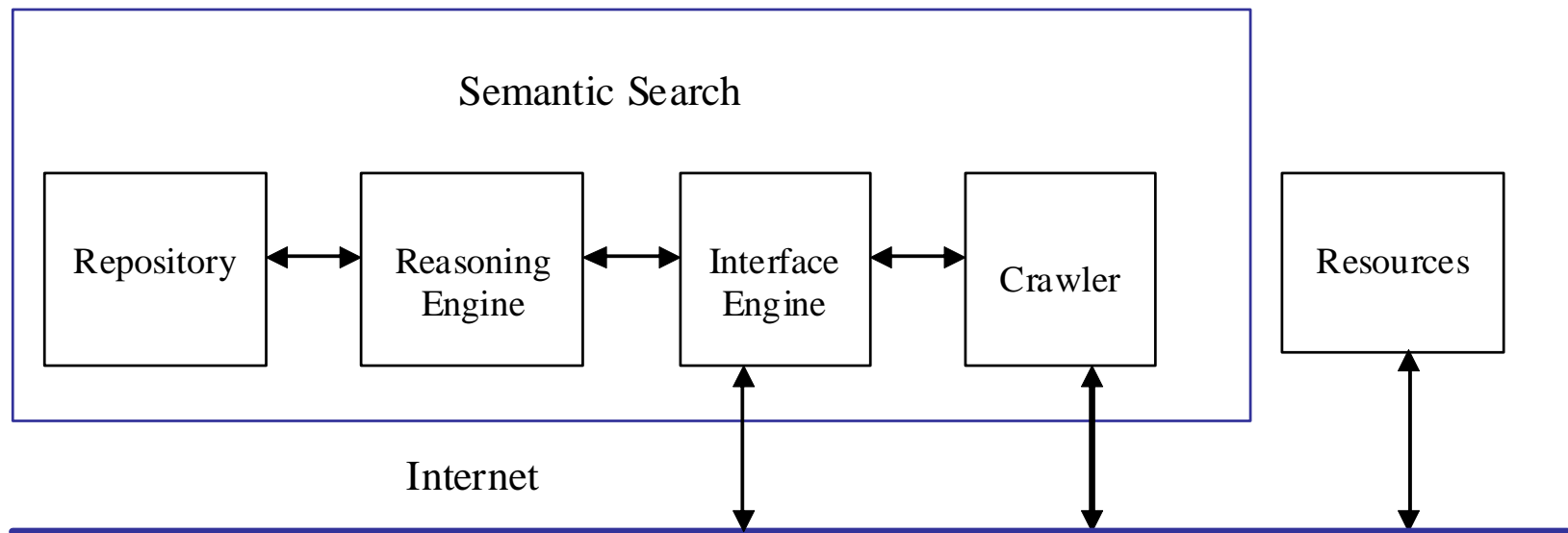
- Smartch: Reasoning and Search
- SAS: Semantic Association Search
- Reasoning System Based on Description Logic
- Ontology Management Tool



Smart Search: Smartch

- Three functions:
 - Basic search
 - Concept search
 - Graphic mode search
- Characteristics:
 - Domain specific
 - Reasoning + search — different from traditional keyword search
 - Better expression — customized graphical way
 - Digging deeper information — search relationship

Architecture of Smartch



Smartch: Basic search



The screenshot shows the SmartCH search engine interface. At the top right, there are links for '基本搜索', '概念搜索', '相关帮助', and '返回首页'. The main heading is 'SmartCH' in a colorful font. Below it is a search input field with the text 'SmartCH' inside, followed by a '搜索' button and links for '返回首页' and '登录'. A status bar indicates '共有26项符合 论文 的查询结果 (搜索用时: 0.032秒)'. The search results are listed below, each with a title, a snippet, and a URL. The first result is '论文发表' with a snippet '论文发表 | 论文发表最新论文 已发表论文...' and URL 'http://idc.hust.edu.cn/~rxli/chinese/publications.htm'. The second result is 'Oracle Developer 2000 学习教程' with a snippet '论文发表...' and URL 'http://idc.hust.edu.cn/~rxli/chinese/oracle2000.htm'. The third result is 'Oracle Developer 2000 学习教程' with a snippet '论文发表...' and URL 'http://idc.hust.edu.cn/~rxli/chinese/books.htm'. The fourth result is 'Some useful notes on how to prepare and deliver a good presentation' with a snippet '... You will present a paper inequally to all papers and to all speaker...de some guidance in paperto each paper to help the present...lved in preparing a paper for presentation. I... and understand t...'. The words 'paper', 'papers', 'paperto', and 'paper' in the snippet are circled in red.

Smartch: Concept search

SmartCH [返回首页](#)

共有23项符合 **教师** 的查询结果 (搜索用时: 0.093秒)

《李瑞轩》

[Oracle Developer 2000 学习教程](#)

译作者: **李瑞轩**, 杨曼红, 王俊 ...

<http://idc.hust.edu.cn/~rxli/chinese/books.htm>

《文坤梅》

[论文发表](#)

李瑞轩, **卢正鼎**, **李瑞轩****李瑞轩**, **卢正鼎**, 於光灿. P2P环境下基于多维数据的资源78. 於光灿, **卢正鼎**, **李瑞轩****李瑞轩**, 赵战西, 王治纲, **文坤梅**, 孙小林. 基于本体的多域访问控制策略集**李瑞轩**75. 於光灿, **卢正鼎**, **李瑞轩**74. 於光灿, **卢正鼎**, **李瑞轩**73. 宋伟, **卢正鼎**, **李瑞轩**59. 彭俊杰, **卢正鼎**, **李瑞轩**56. 唐卓, **卢正鼎**, **李瑞轩**55. 胡和平, 黄保华, 姚寒冰, **卢正鼎**, **李瑞轩****李瑞轩**, 赵战西, 王治...

<http://idc.hust.edu.cn/~rxli/chinese/publications.htm>

发表著作: Oracle Developer
主讲: WebPeer
发表著作: 一种改进的非结构
指导的学生: TerefeMuleta
发表著作: paper004
授课: 数据库系统分析与设计
指导的学生: 吉勇
授课: 语义网与本体论
主讲: 对等计算技术的应用及
姓名: 李瑞轩
授课: 数据库系统原理
研究方向: 系统安全; 分布式
发表著作: paper003
主讲: 斯坦福大学数据库研究
发表著作: 基于P2P的协同设
发表著作: paper005
研究方向: 分布计算; 分布式
指导的学生: 赵战西
指导的学生: 高昶
指导的学生: 章华娟
授课: 对等计算
发表著作: 一种Peer-to-Pe
发表著作: 多数据库系统原理
指导的学生: 胡劲纬
发表著作: 在Java2环境中实
籍贯: 湖北
授课: 面向对象程序设计



Smarth: User-Defined Graphics Mode

新的查询 清空查询 递交查询

2. 针对所有类别的“关联到其它类别”可以建立类别间的关系；
3. 针对查询类别的“添加属性限制”从属性上约束查询类；
4. 对于非查询类别“类别实例化”可以输入实例来限定该类别；
5. “仅保留该类别”将删除选中类别外所有类别和联系；
6. “删除选中类别”将删除选中类别及关联的联系；

显示查询信息

```
graph TD; Q((副教授 as Q  
queryVariable)) -- 授课 --> C((课程 as 数据库系统原理)); Q -- 指导的学生 --> S((学生 as 吉勇)); Q -- 籍贯 --> H((as 湖北));
```


Semantic Association Search

Semantic Association Search(SAS)

Length weight: Long Association Prior

Context weight: Node In&Out weight:

Start Node:

End Node:

Show Explanation

Please select the classes you want to emphasize:

- <http://www.owl-ontologies.com/semrank.owl#Flight>
- <http://www.w3.org/2002/07/owl#Nothing>
- <http://www.owl-ontologies.com/semrank.owl#Course>
- <http://www.owl-ontologies.com/semrank.owl#TA>
- <http://www.owl-ontologies.com/semrank.owl#Professor>
- <http://www.owl-ontologies.com/semrank.owl#Passenger>
- http://www.owl-ontologies.com/semrank.owl#Credit_Card
- <http://www.owl-ontologies.com/semrank.owl#Account>

Semantic Association Search

Time: 390 ms. Existing 6 semantic association relationship.

<http://www.owl-ontologies.com/semrank.owl#r1> and <http://www.owl-ontologies.com/semrank.owl#r9> have following association relationship!

1. r1 depositsInto r8 AcctHolder r6 ownsStockIn r9

Total Value: 0.40803033

2. r1 adviseeof r6 ownsStockIn r9

Total Value: 0.39767677

3. r1 ownsStockIn r5 electedLeader r6 ownsStockIn r9

Total Value: 0.39666668

4. r1 bitsFor r2 forFlight r3 paidBy r4 AcctHolder r5 electedLeader r6 ownsStockIn r9

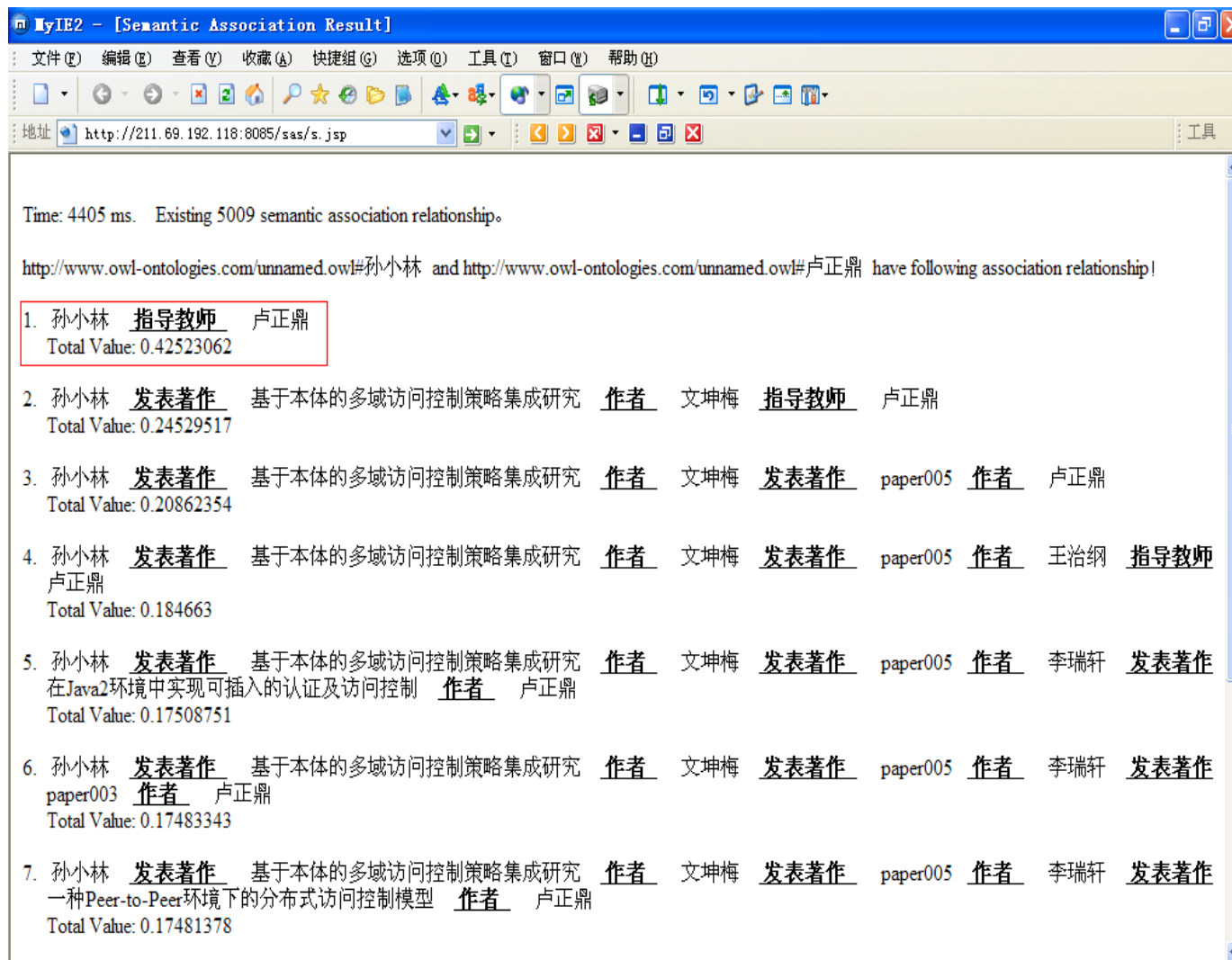
Total Value: 0.38497838

5. r1 audits r7 taughtBy r6 ownsStockIn r9

Total Value: 0.3830303

Result pages: 1 [2](#) [Next page](#)

Semantic Association Search

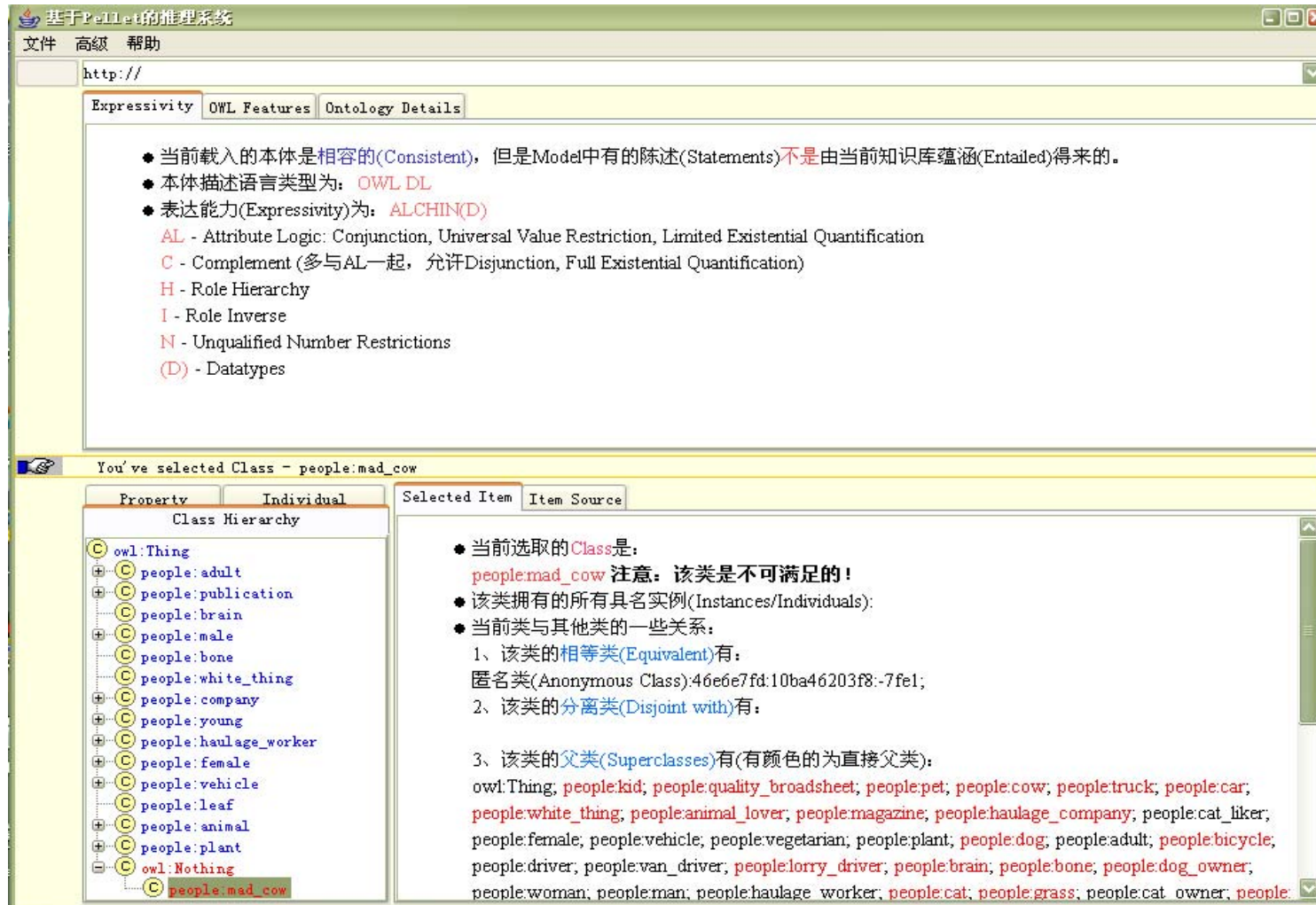


Time: 4405 ms. Existing 5009 semantic association relationship.

<http://www.owl-ontologies.com/unnamed.owl#孙小林> and <http://www.owl-ontologies.com/unnamed.owl#卢正鼎> have following association relationship!

1. 孙小林 指导教师 卢正鼎
Total Value: 0.42523062
2. 孙小林 发表著作 基于本体的多域访问控制策略集成研究 作者 文坤梅 指导教师 卢正鼎
Total Value: 0.24529517
3. 孙小林 发表著作 基于本体的多域访问控制策略集成研究 作者 文坤梅 发表著作 paper005 作者 卢正鼎
Total Value: 0.20862354
4. 孙小林 发表著作 基于本体的多域访问控制策略集成研究 作者 文坤梅 发表著作 paper005 作者 王治纲 指导教师 卢正鼎
Total Value: 0.184663
5. 孙小林 发表著作 基于本体的多域访问控制策略集成研究在Java2环境中实现可插入的认证及访问控制 作者 卢正鼎
Total Value: 0.17508751
6. 孙小林 发表著作 基于本体的多域访问控制策略集成研究 paper003 作者 卢正鼎
Total Value: 0.17483343
7. 孙小林 发表著作 基于本体的多域访问控制策略集成研究一种Peer-to-Peer环境下的分布式访问控制模型 作者 卢正鼎
Total Value: 0.17481378

DL-based Reasoning System



基于Pellet的推理系统

文件 高级 帮助

http://

Expressivity | OWL Features | Ontology Details

- 当前载入的本体是相容的(Consistent), 但是Model中有的陈述(Statements)不是由当前知识库蕴涵(Entailed)得来的。
- 本体描述语言类型为: **OWL DL**
- 表达能力(Expressivity)为: **ALCHIN(D)**
 - AL - Attribute Logic: Conjunction, Universal Value Restriction, Limited Existential Quantification
 - C - Complement (多与AL一起, 允许Disjunction, Full Existential Quantification)
 - H - Role Hierarchy
 - I - Role Inverse
 - N - Unqualified Number Restrictions
 - (D) - Datatypes

You've selected Class - people:mad_cow

Property	Individual	Selected Item	Item Source
Class Hierarchy			
owl:Thing			
people:adult			
people:publication			
people:brain			
people:male			
people:bone			
people:white_thing			
people:company			
people:young			
people:haulage_worker			
people:female			
people:vehicle			
people:leaf			
people:animal			
people:plant			
owl:Nothing			
people:mad_cow			

- 当前选取的Class是:
people:mad_cow 注意: 该类是不可满足的!
- 该类拥有的所有具名实例(Instances/Individuals):
- 当前类与其他类的一些关系:
 - 1、该类的相等类(Equivalent)有:
匿名类(Anonymous Class):46e6e7fd:10ba46203f8:-7fe1;
 - 2、该类的分离类(Disjoint with)有:
 - 3、该类的父类(Superclasses)有(有颜色的为直接父类):
owl:Thing, people:kid, people:quality_broadsheet, people:pet, people:cow, people:truck, people:car, people:white_thing, people:animal_lover, people:magazine, people:haulage_company, people:cat_lover, people:female, people:vehicle, people:vegetarian, people:plant, people:dog, people:adult, people:bicycle, people:driver, people:van_driver, people:lorry_driver, people:brain, people:bone, people:dog_owner, people:woman, people:man, people:haulage_worker, people:cat, people:grass, people:cat_owner, people:

DL-based Reasoning System

```
查看本体内容
rdfs:comment "";
rdfs:label "quality broadsheet";
rdfs:subClassOf ns0:broadsheet .

ns0:cow
a owl:Class ;
rdfs:comment "Cows are naturally vegetarians." ;
rdfs:label "cow" ;
rdfs:subClassOf ns0:vegetarian .

ns0:animal_lover
a owl:Class ;
rdfs:comment "Someone who really likes animals" ;
rdfs:label "animal lover" ;
owl:equivalentClass
[ a owl:Class ;
  owl:intersectionOf (ns0:person [ a owl:Class ;
    owl:minCardinality "3"^^xsd:nonNegativeInteger ;
    owl:onProperty ns0:has_pet
  ])
] .

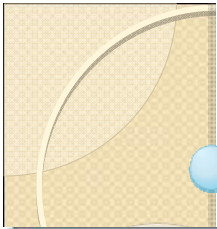
 RDF/XML格式  RDF/简略XML格式  N-Triples格式  N3格式
```

```
ABOX查询
SELECT *
WHERE (?Answer, rdf:type, people:publication)
USING
xsd FOR <http://www.w3.org/2001/XMLSchema#>,
dc FOR <http://purl.org/dc/elements/1.1/>,
rdfs FOR <http://www.w3.org/2000/01/rdf-schema#>,
people FOR <http://cohse.semanticweb.org/ontologies/people#>,
rdf FOR <http://www.w3.org/1999/02/22-rdf-syntax-ns#>,
daml FOR <http://www.daml.org/2001/03/daml+oil#>,
owl FOR <http://www.w3.org/2002/07/owl#>

Answer
people:The_Times
people:The_Guardian
people:Daily_Mirror
people:The_Sun

运行
```





Ontology Management Tool

The screenshot displays the Redfly Ontology Management Tool interface, which is divided into several panels:

- Table List:** A list of database tables including corporate, director, events, people, projects, publications, research, research_people, resource, students, and teacher.
- Ontology View:** A hierarchical tree structure showing classes such as corporate, events, people (with sub-classes director and students), and research (with sub-classes projects, publications, research_people, and resource).
- Instances List:** A table showing instances of the 'students' class. The instances are students-4, students-5, students-6, and students-7, all belonging to the 'students' class.
- EDIT Instance:** A panel with buttons for Add, Delete, Modify, and Show All.

At the bottom left, there is a logo for IDG-Lab and the text "Huazhong University of Science and Technology".



Grants of Semantic Search Group

- 2006-2007, Semantic Search based on Ontology Repository Reasoning. (Supported by Huawei Corp. under grant YBIN2006089)
- 2009-2010, Semantic Search Based on Retrieval and Reasoning. (Supported by National Key Lab. Open Foundation of China under grant SKLSE20080718)
- 2009-2010, Research on semantic search based on social annotation in special domain. (Supported by Youth Innovation Fund of Huazhong University of Science and Technology)

Publications

- Yufei Li, Yuan Wang, Xiaotao Huang. A Relation-Based Search Engine in Semantic Web. *IEEE Transactions on Knowledge and Data Engineering*, 2007, 19(2): 273-282
- Zhang Mao-yuan, LU Zheng-ding, ZOU Chun-yan. A Chinese Word Segmentation Based on Language Situation in Processing Ambiguous Words. *Information Sciences*, Elsevier, 2004, 162 (3-4): 275-285
- Ruixuan Li, Zhengding Lu, Weijun Xiao, Wei Wu. XML-based Integration Data Model and Schema Mapping in Multidatabase Systems. *Journal of Systems Engineering and Electronics*, 2005, 16(2): 437-444
- Zhengding Lu, Chunlin Li, Layuan Li. Coordinating Mobile Agent by the XML-Based Tuple Space. *Journal of Computer Science and Technology*, 2002, 17(6): 888-900
- Ruixuan Li, Xiaolin Sun, Zhengding Lu, Kunmei Wen, Yuhua Li. Towards a Type-2 Fuzzy Description Logic for Semantic Search Engine. In: Proc. of *APWeb/WAIM 2007*, LNCS 4505, Huangshan, China, 2007, pp. 805-812
- Kunmei Wen, Zhengding Lu, Ruixuan Li, Xiaolin Sun, Zhigang Wang. A Semantic Search Conceptual Model and Application in Security Access Control. In: Proc. of *ASWC 2006*, LNCS 4185, Beijing, 2006, pp. 366-376
- Ruixuan Li, Kunmei Wen, Zhengding Lu, Xiaolin Sun, Zhigang Wang. An Improved Semantic Search Model Based on Hybrid Fuzzy Description Logic. In: Proc. of *FCST 2006*, Fukushima, Japan, 2006, pp. 139-146
- Mao-yuan Zhang, Zheng-ding Lu. A Fuzzy Classification Based on Feature Selection for Web Pages. In: Proc. of *IEEE/WIC/ACM WI 2004*, Beijing, 2004, pp. 469-472



Patents

- System for Topic Crawler Based on Social Annotations. China Patent (pending, application No. 200910062020.0), 2009
- System for Near-Duplicate Page Removal Based On Parallel Processing Framework. China Patent (pending, application No. 200910061694.9), 2009
- System for Website Oriented Secure Database Search Engine. China Patent (pending, application No. 200810048012.6), 2008

Data Mining Group



Research Interests

- Dynamic social network models
- Community detection
- Graph pattern mining and query
- Graph classification
- Link prediction



Research Issues

- Social network models
 - Hidden Markov model
 - Dynamic weighted directed graphs
- Community detection algorithms
 - A well designed genetic algorithm to solve maximum likelihood problem
 - StreamGroup: to discover time-evolving communities and to detect change-points



Research Issues

- **Graph pattern mining and query**
 - Mining frequent graph pattern with direction, label, weight
 - Mining frequent graph pattern in graph stream
 - Mining top-k frequent graph pattern
 - Graph pattern query and answer



Research Issues

- Knowledge engineering
 - Distributed knowledge discovery framework
 - Semantic data integration based on privacy protection
 - Data mining ontology development
 - Data mining service selection in SOA



Research Issues

- **Semantic Search Combining Social Annotation**
 - Extracting semantic information from social annotation
 - Social network based on social annotation
 - Semantic search model combining social annotation
 - Methods for ranking search results based on social annotation



iCon: Conference Search System

- Research issues:
 - Web information extraction (Event extraction)
 - Information integration
- Objective:
 - To provide an **academic conference information extraction, integration, search and distribution** system which is a convenient, easy-to-use and full-scale information system in the field of the **computer science and technology**.



iCon: Sources Integrated

- (1) [DBLP Computer Science Bibliography](#)
- (2) [Microsoft Libra Conferences](#)
- (3) [WikiCFP](#)
- (4) [Computer Science Conference Ranking](#)
<http://www3.ntu.edu.sg/home/ASSourav/crank.htm>
- (5) [Computer Science Conference Ranking](#) <http://www.cs-conference-ranking.org>
- (6) [CiteSeer Estimated Venue Impact Factors](#)
<http://citeseerx.ist.psu.edu/stats/venues>
- (7) The Grid Laboratory that belongs to the Huazhong University of Science and Technology [Call for Papers](#)
- (8) Some special issues of international journals

iCon: Prototype System

The screenshot shows the IDC_SEARCH website interface. At the top, there is a navigation bar with the text "IDC_SEARCH » Conferences Search" and links for "Register" and "Login". Below this is a secondary navigation bar with links for "HOMEPAGE", "TAGS", "SERIES", "CATEGORIES", "POST A CFP", and "ABOUT". The main content area features a "Welcome" message and a "SEARCH" section with a text input field, a "Search" button, and a link to "Advanced Search". Below the search section is a section titled "UpComing Events" which displays a table of the first 30 records. The table has columns for Event, DeadLine, Notification, Date, Location, Publisher, Rank, and Impact. The events listed include WAOA 2009, CIKM 2009, KESE 2009, VRST 2009, and AIDC 2009.

Event	DeadLine	Notification	Date	Location	Publisher	Rank	Impact
WAOA 2009	06/03/2009	07/15/2009	09/10/2009--- 09/11/2009	Copenhagen Denmark		N/A	N/A
CIKM 2009	06/08/2009	07/25/2009	11/02/2009--- 11/06/2009	Hongkong China	ACM	★★★★	0.73
KESE 2009	06/08/2009	07/08/2009	09/15/2009--- 09/15/2009	Padeborn Germany		N/A	N/A
VRST 2009	06/10/2009	N/A	N/A	Kyoto, Japan	ACM	N/A	N/A
AIDC 2009	9th International Conference on ARTIFICIAL INTELLIGENCE and DIGITAL COMMUNICATIONS						

iCon: Prototype System

Conferences

	Event	DeadLine	Notification	Date	Location	Publisher	Rank	Impact
<input type="checkbox"/>	CVPR 2008	IEEE Conference on Computer Vision and Pattern Recognition						
		11/26/2007	N/A	06/24/2008--- 06/26/2008	Anchorage Alaska		☆☆☆☆☆	N/A
<input type="checkbox"/>	CVPR 2009	IEEE Computer Society Conference on Computer Vision and Pattern Recognition						
		11/20/2008	N/A	06/20/2009--- 06/26/2009	MiamiBeach Florida		☆☆☆☆☆	N/A
<input type="checkbox"/>	ACL-SRW 2009	ACL 2009 Student Research Workshop						
		02/22/2009	04/12/2009	08/02/2009--- 08/07/2009	Singapore Singapore		☆☆☆☆☆	1.44
<input type="checkbox"/>	ACL 2008 SRW 2008	ACL 2008 Student Research Workshop						
		02/10/2008	02/28/2008	06/15/2008--- 06/20/2008	ColumbusOhio		☆☆☆☆☆	1.44
<input type="checkbox"/>	ACL 2008	The 46th Annual Meeting of the Association for Computational Linguistics						
		01/10/2008	02/28/2008	06/15/2008--- 06/20/2008	Columbus Ohio		☆☆☆☆☆	1.44
<input type="checkbox"/>	ACL demos 2008	Call for Demos, The 46th Annual meeting of the Association for Computational Linguistics						
		03/14/2008	04/14/2008	06/15/2008--- 06/20/2008	Columbus Ohio USA		☆☆☆☆☆	1.44
<input type="checkbox"/>	ACL-IJCNLP 2009	The 47th Annual Meeting of the Association for Computational Linguistics (ACL) and the 4th IJCNLP						
		02/22/2009	04/12/2009	08/02/2009--- 08/07/2009	Singapore		☆☆☆☆☆	1.44
<input type="checkbox"/>	DASFAA 2009	The 14th International Conference on Database Systems for Advanced Applications						
		10/03/2008	12/12/2008	04/21/2009--- 04/23/2009	Brisbane Australia		☆☆☆☆	0.28
<input type="checkbox"/>	COLING 2008	The 22nd International Conference on Computational Linguistics						
		03/30/2008	05/30/2008	08/18/2008--- 08/22/2008	Manchester UK		☆☆☆☆	N/A
<input type="checkbox"/>	CAIP 2009	13th International Conference on Computer Analysis of Images and Patterns						

iCon: Prototype System

Tags

artificial intelligence(238)	<u>NLP(216)</u>	communications(215)	databases(214)
<u>linguistics(212)</u>	networking(159)	web(142)	software engineering(133)
security(118)	information retrieval(111)	HCI(111)	data mining(109)
signal processing(107)	machine learning(96)	software(93)	multimedia(90)
wireless(82)	<u>electron devices(77)</u>	computer(75)	image processing(75)
robotics(75)	computer vision(68)	computer graphics(66)	circuits(65)
(65)	systems(63)	control(61)	computer architecture(60)
embedded systems(58)	semantic web(56)	bioinformatics(53)	distributed systems(53)
automation(50)	simulation(47)	programming languages(44)	nanotechnology(41)
information systems(40)	information technology(39)	computer science(38)	life sciences(37)
pattern recognition(37)	semantics(37)	industrial electronics(36)	sensor networks(36)
internet(35)	algorithms(34)	environment(33)	web 2.0(33)
ontology(33)	biomedical engineering(31)	mobility(29)	e-commerce(29)
computational linguistics(29)	engineering(28)	education(28)	<u>IR(28)</u>
modeling(28)	computation theory(27)	<u>design automation(27)</u>	communication(26)
cognitive science(26)	biology(25)	electro-optics(24)	lasers(24)
biotechnology(24)	measurement(24)	chemistry(23)	e-learning(23)

iCon: Prototype System

Welcome root SEARCH

[MySubmission](#) [MyFavorite](#) [SignOut](#) [Profile](#) [Advanced Search](#)

Advanced Search

Category	<input type="text" value="Artificial Intelligence"/>		
Key_Words	Search options: <input type="text" value="Event"/> <input type="text" value="E"/> *	Match:	<input type="text" value="fuzzy"/>
Date	from: <input type="text" value="2009-06-01"/>	to: <input type="text" value="2009-08-01"/>	
Deadline:	from: <input type="text"/>	to: <input type="text"/>	
Location	<input type="text"/>	Rank	<input type="text" value=">= 0"/>
<input type="button" value="Search"/>			



Grants in Data Mining Group

- The dynamic financial network analysis technique research basing on link mining (Supported by [NSFC](#), 70771043)
- Decision-making System of The National Foreign Exchange Management (Supported by [Key Tech R&D Program](#), 2001BA102A06-11)
- Instrument device and high quality resource sharing system (Supported by [211 Program](#))

Publications

- Yiqun Huang, Zhengding Lu, Heping Hu. A New Permutation Approach for Distributed Association Rule Mining. Proceedings of the 14th ACM International Conference on Information and Knowledge Management (**CIKM 2005**), ACM, Bremen, Germany, 2005, pp. 351-352
- Community Mining on Dynamic Weighted Directed Graphs. to appear in Proceedings of the 18th ACM International Workshop on Information and Knowledge Management (**CIKM Workshop**), 2009
- Discovering Hidden Group in Financial Transaction Network Using Hidden Markov Model and Genetic Algorithm, in Proceedings of the 6th International Conference on Fuzzy Systems and Knowledge Discovery (**FSKD'09**), Tianjin,China ,AUGUST 2009:253-258
- Yuhua Li, Quan Lin, Gang Zhong, Dongsheng Duan, Yanan Jin, Wei Bi, A Directed Labeled Graph Frequent Pattern Mining Algorithm based on Minimum Code, the 3rd International Conference on Multimedia and Ubiquitous Engineering (**MUE 2009**), Qingdao,China JUNE 2009:353-359
- Li Yuhua, Lu Zhengding. Ontology-based universal knowledge grid: Enabling knowledge discovery and integration on the grid. Proceedings - 2004 IEEE International Conference on Services Computing, **SCC 2004**, 2004, 557-560

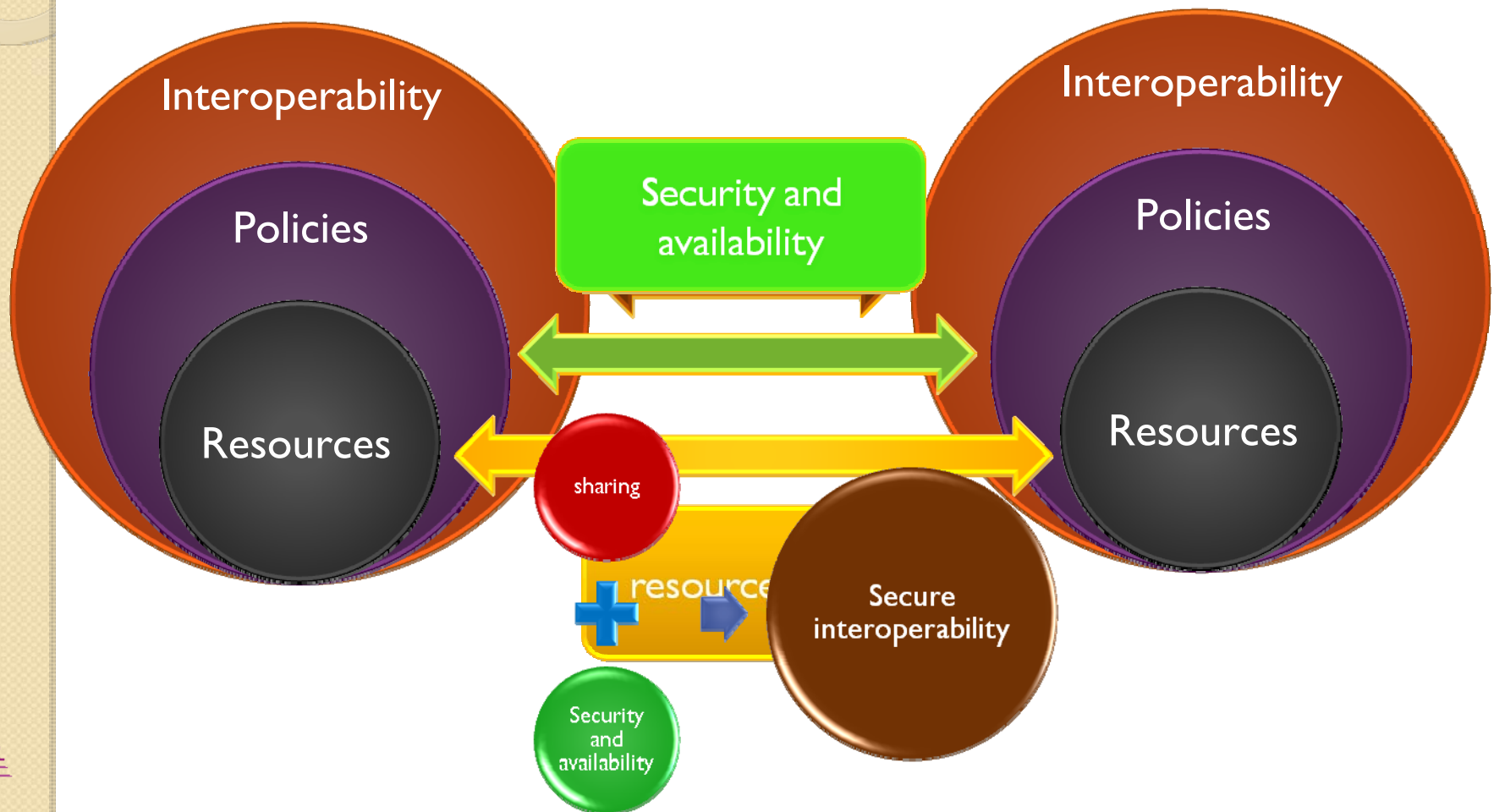


Patents

- A monitoring and analysis method of dynamic financial network (Application No: 200910063081.9)
- System for Topic Crawler Based on Social Annotations. China Patent (pending, application No. 200910062020.0), 2009

Distributed Security Group

Secure Interoperation





Challenges and Solutions

- **Challenges**
 - Heterogeneity in access control policies
 - Security policy optimization
 - Security & availability
- **Solutions**
 - Role mapping
 - Attribute mapping: IUCON
 - Logic programming (CLP)
 - Risk assessment

RBAC-based Secure Interoperation

- How to establish secure interoperability? (Hu & Li, ICISC 2007)
- Formalization of role-based secure interoperability (Hu & Li, TrustCom 2009)
- Theoretic analysis of role-based secure interoperability (Hu & Li, NSS 2009)



Request-Driven Approach

- Request-Driven Role Mapping Framework (Li & Tang'08, International Journal of Computer Systems Science & Engineering)
 - Role mappings based on user requests
 - Flexible policy expression and inter-domain policy mapping
 - Minimal Unique Set (MUS)
 - To perform the privilege query in general hybrid role hierarchies for special external requests



Attribute Mapping Approach

- IUCON (Lu & Li, ISC09)
- Shortcomings of interoperation based on RBAC
 - Static authorization
 - No further enforcement during the access
- Our approach
 - Attribute mapping based interoperation policy framework



SoD in UCON

- Specification and Enforcement of Static Separation-of-Duty Policies in Usage Control (Lu & Li, ISC 2009)
- Why study SoD in UCON
 - One of RBAC's great advantages is that SoD rules can be implemented in a natural and efficient way
 - UCON has been considered as the next generation access control model
 - SSoD is a important type of SoD
 - UCON_A is a sub-model of UCON only considering authorizations
- A set-based specification scheme for SSoD



Safety & Availability

- Consistency Checking of Safety and Availability in Access Control (Li & Lu, *IEICE Transactions on Information and Systems*, 2009)
 - **Safety properties** ensuring that users who should not have an access do not get the access
 - E.g., Static Separation-of-Duty Policies
 - **Availability properties** is about enabling access
 - E.g., Availability Policies
 - The safety and availability policies may conflict with each other due to their opposite focuses



Logic Approach

- Formalization of RBAC-based secure interoperation in Constraint Logic Programming (Hu & Li, TrustCom 2009)
- Managing Authorization Provenance: a Modal Logic Based Approach (Hu & Li, ICTAI 2009)



Risk Assessment

- MD-R²BAC: Risk based dynamic access control (Tang & Li, WISA07)
- R²BAC: Risk & Role Based Access Control (Li & Hu, 2008 Journal on Communications)
 - A fine-grained authorization mechanism is enabled
 - It is possible to monitor users' behaviors and adjust their permission sets in a real time manner



Security in Database & Information Retrieval

- **SeSeek**
 - Secure search based on access control
- **Mimir**
 - Encrypted full-text retrieval
- **AD-SDB**
 - Andin secure database system



http://idc.hust.edu.cn/seseek/

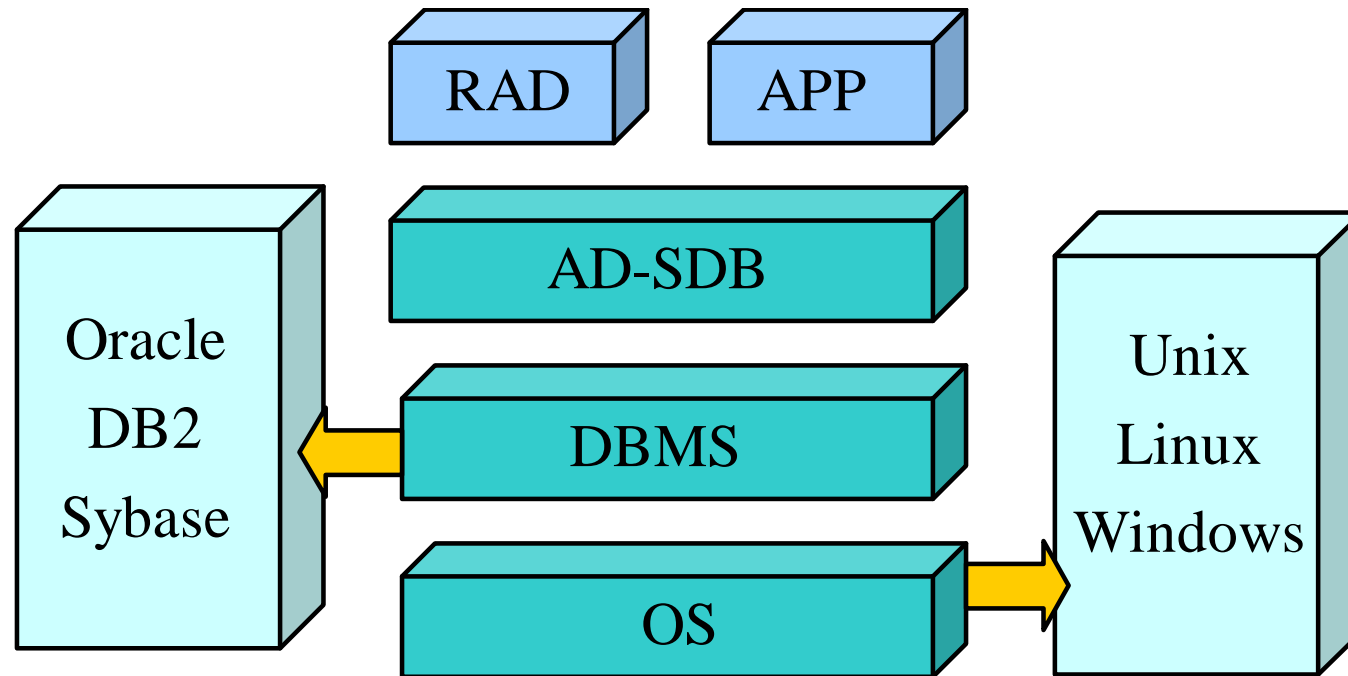


Mimir™

密文全文检索

http://idc.hust.edu.cn/mimir/

AD-SDB



- Wuhan Huagong Andin Information Technology Co., Ltd
- <http://www.andin.com.cn>

Grants in Distributed Security Group

- Optimization Model for Multi-domain Security Policies Based on Multiple Criteria Decision Making (Supported by [NSFC](#))
- Risk Evaluation Model for Information Exchange Based on Multiple Autonomous Domains (Supported by [NSFC](#))
- Key Technologies of Distributed Ciphertext Information Retrieval System (Supported by [863 Program](#))
- Encrypted Full Text Retrieval Middleware (Supported by [Electronic Information Industry Development Fund](#) of China)
- Key Technologies of Encrypted Full Text Retrieval (Supported by National Cipher Development Fund of China)
- Secure Search Engine Based on Access Control (Supported by [Software Development Fund of Hubei Province](#))
- Risk Assessment Model of Information Sharing across Distributed and Heterogeneous Multi-Domains (Supported by [NSF-HB](#))
- Policy-based Secure Interoperability among Multi-Domains (Supported by [SKLSE Open Foundation](#))

Publications

- Ruixuan Li, Jianfeng Lu, Zhengding Lu, Xiaopu Ma: Consistency Checking of Safety and Availability in Access Control. **IEICE Transactions on Information and Systems**, 2009
- Ruixuan Li, Zhuo Tang, Zhengding Lu, Jinwei Hu. Request-Driven Role Mapping Framework for Secure Interoperation in Multi-Domain Environments. **International Journal of Computer Systems Science and Engineering**, CRL Publishing, 2008, 23(3): 193-207
- Jinwei Hu, Yan Zhang, Ruixuan Li, Zhengding Lu. Managing authorization provenance: A modal logic based approach. In: Proc. of **ICTAI 2009**, Newark, New Jersey, USA, 2009.
- Jianfeng Lu, Ruixuan Li, Vijay Varadharajan, Zhengding Lu, Xiaopu Ma. Secure Interoperation in Multidomain Environments Employing UCON Policies. In: Proc. of **ISC 2009**, Pisa, Italy, 2009
- Jianfeng Lu, Ruixuan Li, Zhengding Lu, Jinwei Hu, Xiaopu Ma. Speciation and Enforcement of Static Separation-of-Duty Policies in Usage Control. In: Proc. of **ISC 2009**, Pisa, Italy, 2009

Publications (Cont.)

- Jinwei Hu, Ruixuan Li, Zhengding Lu. On Role Mappings for RBAC-based Secure Interoperation. In: Proc. of **NSS 2009**, Gold Coast, Australia, 2009
- Jinwei Hu, Ruixuan Li, Zhengding Lu. RBAC-based Secure Interoperation using Constraint Logic Programming. In: Proc. of **TrustCom 2009**, Vancouver, Canada, 2009
- Jianfeng Lu, Ruixuan Li, Zhengding Lu, Xiaopu Ma. A Role-based Access Control Architecture for P2P File-Sharing Systems Using Primary/Backup Strategy. In: Proc. of **NSWCTC 2009**, Wuhan, China, 2009
- Jianfeng Lu, Ruixuan Li, Zhengding Lu, Yanan Jin. Dynamic Enforcement of Separation-of-Duty Policies. In: Proc. of **MINES 2009**, Wuhan, China, 2009
- Xiaopu Ma, Ruixuan Li, Zhengding Lu, Jianfeng Lu. Global Static Separation of Duty in Multi-domains. In: Proc. of **MINES 2009**, Wuhan, China, 2009
- Jianfeng Lu, Ruixuan Li, Zhengding Lu, Bing Li. Integrating Trust and Role for Secure Interoperation in Multi-Domain Environment. In: Proc. of **ISA 2008**, Busan, Korea, 2008, pp. 77-82

Publications (Cont.)

- LI Rui-xuan, GAO Chang, GU Xi-wu, LU Zheng-ding. Research on Credit Counting and Risk Evaluation for C2C E-commerce. **Journal on Communications**, 2009, 30(7)
- LI Rui-xuan, HU Jin-wei, TANG Zhuo, LU Zheng-ding. R2BAC: A risk-based multi-domain secure interoperation model. **Journal on Communications**, 2008, 29(10): 58-69
- Jinwei Hu, Ruixuan Li, Zhengding Lu. Establishing RBAC-based Secure Interoperability in Decentralized Multi-domain Environments. In: Proc. of **ICISC 2007**, Seoul, South Korea, 2007, pp. 49-63
- Ruixuan Li, Guangcan Yu, Zhengding Lu, Wei Song. P2P-based Locking in Real-Time Collaborative Editing Systems. In: Proc. of **CSCVD 2007**, Melbourne, Australia, 2007, pp. 24-29
- Zhuo Tang, Ruixuan Li, Zhengding Lu, Zhumu Wen. Dynamic Access Control Research for Inter-operation in Multi-domain Environment Based on Risk. In: Proc. of **WISA 2007**, Jeju Island, Korea, 2007, pp. 277-290
- Zhuo Tang, Ruixuan Li, Zhengding Lu. A Request-Driven Role Mapping for Secure Interoperation in Multi-Domain Environment. In: Proc. of **NSS 2007**, Dalian, China, 2007, pp. 83-90



Patents

- System for Distributed Cipher Full Text Retrieval. China Patent (pending, application No. 200910062129.4), 2009
- System for Cipher-based Secure Full Text Indexing and Retrieval. China Patent (pending, application No. 200910061325.X), 2009
- System for Multi-Policy Supported Secure Java Web Application Page Tag. China Patent (pending, application No. 200810197231.0), 2008
- System for Website Oriented Secure Database Search Engine. China Patent (pending, application No. 200810048012.6), 2008
- Method for Risk-based Distributed Access Control. China Patent (pending, application No. 200710052983.3), 2007
- System for Secure Search Engine Based on Access Control. China Patent (No. ZL200710052025.6), 2007
- System for Ciphertext-Based Full Text Retrieval. China Patent (No. ZL200610124691.1), 2006

Multimedia Security Group

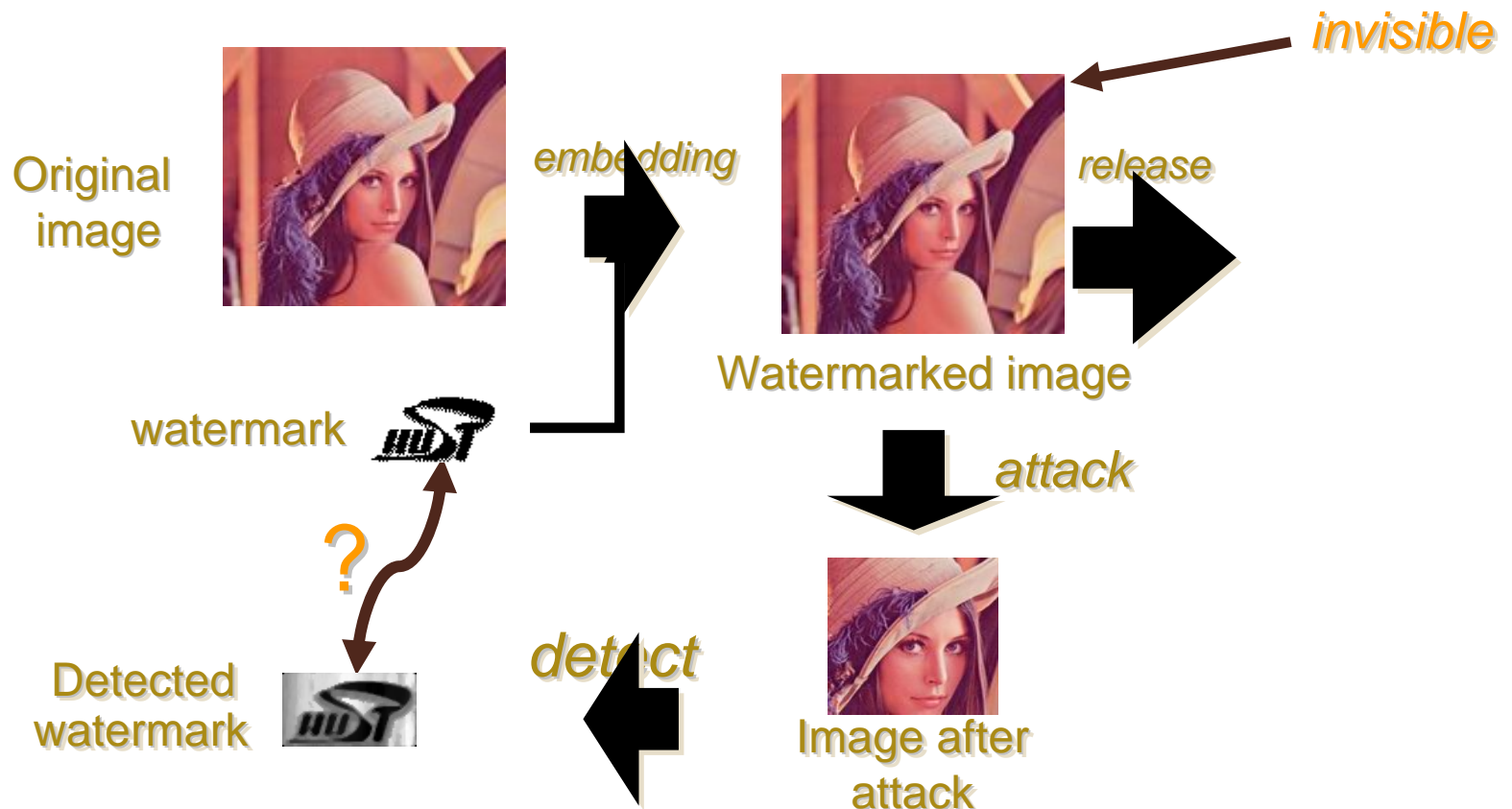


Background

- **Rapid Development of IT**
 - Duplication and dissemination of multimedia data become more and more convenient
 - Digital copies with the same quality as original data can be got much more easily and quickly
- **Problems:**
 - Copyright Piracy
 - illegal use and copyright dissension
- **Solution:**
 - Watermarking

Watermarking

- ✓ Imperceptibly added to the cover-signal in order to convey the hidden data
- ✓ Embedding information into another object/signal





Our Focus

- **Challenges**
 - How to resist geometric attacks
 - Collusion-resistant fingerprinting
- **Video Watermarking**
 - Real-time
 - Resist geometric attacks
 - Fulfill high-capacity watermark



Real-time Video Watermarking

- Improved Difference Energy Watermarking (IDEW) algorithm
- Difference Number Watermarking (DNW) algorithm
- Turbo-based DNW (T-DNW) algorithm
- Watermarking method based on extended m-sequences



High Capacity Watermark Embedding

- Energy Modulated Watermarking (EMW) algorithm
- Logarithmic scaling applied in EMW
- Multiple watermarking based on CDMA technique



Real-time Video Watermarking against Geometric Attacks

- New real-time video watermarking model
- Method based on self-recognition watermark pattern



Benchmarking for Video Watermarking Algorithms

- Video Benchmark (VBmark) v1.0
 - A visual benchmarking tool for video watermarking algorithms, which simulates the intentional or unintentional attacks for video data

Research Grants

- Jan.2009-Dec.2010, the Active Copyright Tracing and Surveillance System for Multimedia on Internet. (Supported by [National 863 Hi-Tech Program](#))
- Jan.2009 – Dec.2011, Research on security analysis and evaluation of digital fingerprinting system. (Supported by [NSFC](#))
- Jan.2009 – Dec.2011, Research on Geometric Distortion Resilient Video Copy Detection Technique. (Supported by [NSFC](#))
- Jan.2006 – Dec.2008, Research on real-time watermarking for compressed video against geometric attack. (Supported by [NSFC](#))
- Jan.2008 – Dec.2009, Research and applications of the digital TV terminal interface protection techniques based on video watermarking. (Supported by [Electronic Development Fund](#) from Ministry of Information Industry of China)
- Jan.2006 – Dec.2007, Research on high-capacity and real-time watermarking for MPEG streams. (Supported by Natural Science Foundation of Hubei Province ([NSF-HB](#)))
- Jun.2004 – Jun.2006, Video monitoring and copyright protection system based on real-time digital watermarking (Supported by [Innovation Fund for Technology Based Firms](#) from Ministry of Science and Technology of China under)
- Jun.2004 – Jun.2006, Video monitoring and retrieval system based on real-time digital watermarking (Supported by [Electronic Development Fund](#) from Ministry of Information Industry of China)

Publications

- Liyun Wang, Hefei Ling, Fuhao Zou et al, Spermatogonium image recognition using Zernike moments. **Computer Methods and Programs in Biomedicine**, Elsevier, 2009,95(1):10-22 (SCI, EI)
- Fuhao Zou, Zhengding Lu, Hefei Ling. A Multiple Watermarking Algorithm Based on CDMA Technique. Proceedings of the 12th **ACM International Conference on Multimedia (MM'04)**, 2004. (EI)
- Hefei Ling, Wugang Yuan, Fuhao Zou, Zhengding Lu. Log-scaling Magnitude Modulated Watermarking Scheme. **Science in China Series F: Information Sciences**, 2007.3 (SCI, EI)
- Zhihua Xu, Hefei Ling, Fuhao Zou et al, Fast and robust video copy detection scheme using full DCT coefficients, IEEE International Conference on Multimedia and Expo (**ICME 2009**), pp. 434-437, 2009.
- Jin.Liu, Hefei.Ling, Fuhao Zou et al, Image splicing detection using multi-resolution histogram, in IEEE Pacific-Rim Conference on Multimedia. 2009. Bangkok, Thailand.
- Shangqin Xiao, Hefei Ling, Fuhao Zou et al, Secret Sharing based video watermark algorithm for multiuser. 7th international Workshop on Digital Watermarking (**IWDW 2008**), Busan, Korea, 2008.
- Yan Meng, Xiaoyun Shen, Renbiao Wu, Hefei Ling. Remote Sensing Image Fusion Using Multiwavelet Transform Combined with HPF. IEEE International Conference on Multimedia and Expo (**ICME'2007**), 2007. (EI)

Publications (Cont.)

- Meisen Pan, Fen Zhang, Hefei Ling. An Image Binarization Method Based on HVS. IEEE International Conference on Multimedia and Expo (**ICME'2007**), 2007. (EI)
- Chunhua Li, Hefei Ling, Zhengding Lu. Semi-Fragile Watermarking Based on SVM for Image Authentication. IEEE International Conference on Multimedia and Expo (**ICME'2007**), 2007. (EI)
- Hefei Ling, Zhengding Lu, Fuhao Zou, Wugang Yu. A Geometrically Robust Watermarking Scheme Based on Self-recognition Watermark Pattern. IEEE International Conference on Multimedia and Expo (**ICME'2006**), 2006. (EI)
- Fuhao Zou, Zhengding Lu, Hefei Ling. Real-time video watermarking based on extended m-sequences. 2005 IEEE International Conference on Multimedia and Expo (**ICME'2006**).(EI)
- Hefei Ling, Zhengding Lu, Fuhao Zou. New Real-time Watermarking Algorithm for Compressed Video in VLC Domain. IEEE International Conference on Image Processing (**ICIP'2004**), Singapore, October 2004, pp. 2171-2174. (EI)
- ShuangYuan Yang, ZhengDing Lu, FuHao Zou. A Robust Adaptive Image Watermarking Algorithm. 2004 IEEE International Conference on Multimedia and Expo (**ICME'2004**), pp. 1723-1726.(EI)



Patents

- A Video Copyright Protection and Monitor System for Digital TV (ZL 200610018787.X)
- A Three Tier Framework Intelligent Image Steganalysis System (ZL200610018494.1)
- An active check authentication and monitor system for digital TV program (ZL200610018835.5)
- A Content-based robust image copy detection method (200810048164.6)
- A real-time video watermarking method against geometric attacks (200910060551.6)
- An digital content protection method and system towards terminal interface (200810048824.0)

Software Copyright

- Real-time Watermarking Software for MPEG-encoded Video Data (National computer software copyright certificate, 2004SR09077)
- Benchmarking System for Video Watermarking Algorithms. (National computer software copyright certificate, 2007SR09160)
- VPMark Video Watermarking System Software(National computer software copyright certificate, 2007SR09161)
- Image copy tracing system software on Internet(National computer software copyright certificate, 2008SR11023)
- Image Copy Detection System Software based on Linux Platform(National computer software copyright certificate, 2008SR11024)
- Digital Terminate Interface Protection System Software (National computer software copyright certificate, 2009SR10080)



Summary

- Resource sharing in peer-to-peer network
- Semantic search
- Link analysis & link mining
- Secure interoperability in distributed systems
- Watermarking & DRM
- Intelligent multimedia

Thank you!

<http://idc.hust.edu.cn>

