

# Short Presentation of DMOD

A decorative graphic consisting of several horizontal lines of varying lengths and colors (teal, white, and light blue) extending across the width of the slide below the title.

# University of Ioannina

Established in 1964

Independent University since 1970



## School of Philosophy

Department of Philology

Department of History and Archaeology

Department of Philosophy, Education and Psychology

## School of Sciences

Department of Mathematics

Department of Physics

Department of Chemistry

**Department of Computer Science**

## School of Education

Department of Primary School Education

Department of Pre-School Education

## School of Medicine

## School of Sciences and Technologies

Department of Materials Science and Engineering

Department of Biological Applications and Technologies

## Independent Departments

Department of Economics

Department of Plastic Arts and Art Sciences



# *Department of Computer Science*

**Established in 1993**



**23 Faculty members**

**Research in**

- ❖ **Data management**
- ❖ **Algorithms**
- ❖ **Graphics**
- ❖ **Machine learning**
- ❖ **Image processing and analysis**
- ❖ **Software engineering**
- ❖ **Systems**



## Distributed Management of Data Laboratory

*DMOD performs research on various topics in distributed management, processing and visualization of data.*

- Data management with emphasis on mobile, ubiquitous, distributed overlays, cloud computing, social networks
- Computer Graphics, CAD and Data Visualization
- Parallel Processing
- Information Systems Architecting, with emphasis on data warehousing, conceptual modeling, database evolution and quality
- Middleware



## Research

- In distributed overlays (p2p systems and publish subscribe) –  
*recent interest in social networks and cloud*
- On the integration of information retrieval and data management
  - Preferences,
  - Recommendations, and
  - Diversified search



## Preferences for Sharing Distributed Content

### Why Preferences?

Huge amount of information available to diverse population => need to personalize

### How?

Through preferences: Two fundamental philosophies for expressing preferences:

- **Quantitative approach**

- Using scoring functions that assign a numeric score (interest) to an item:



- **Qualitative approach**

- Binary relations between pairs of items:



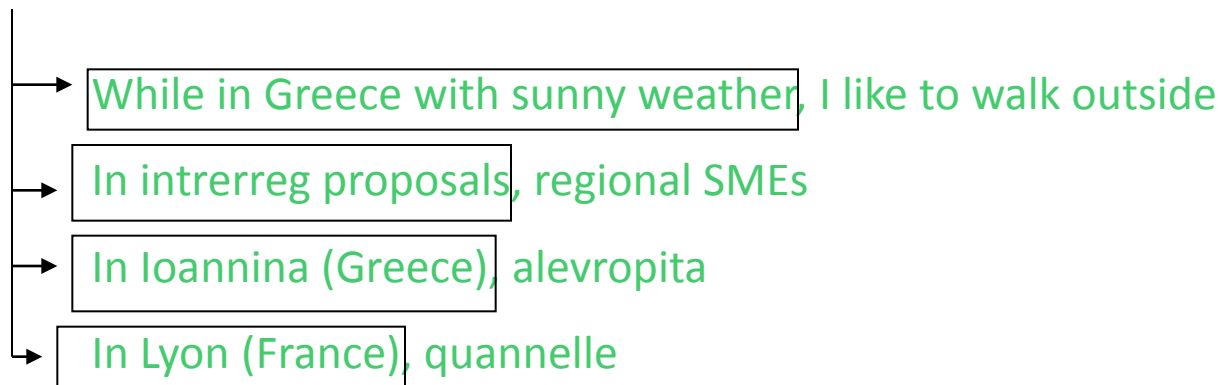
## Preferences for Sharing Distributed Content

### Context-Aware Preferences in a nutshell

Preference with two parts

(**context-descriptor**, preference)

context

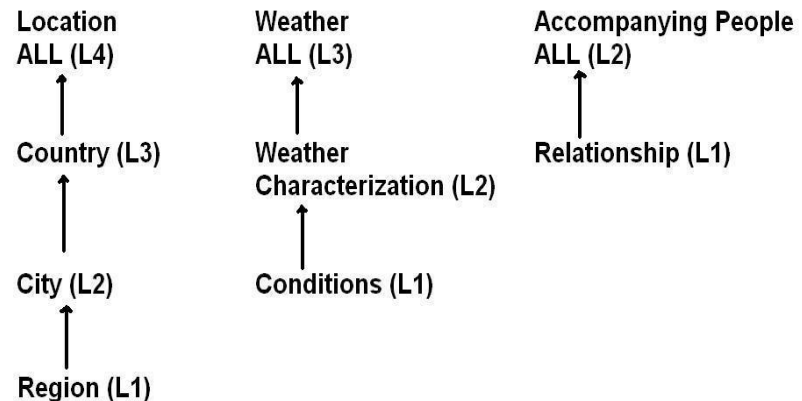


## Preferences for Sharing Distributed Content

### Context-Aware Preferences in a nutshell

- Context Attributes
- Hierarchical Domains
- Context Resolution:

Find the preferences applicable to the current context through special data structures the Profile Tree and the Context Graph



- **Efficient top-*k* computation through pre-computation of representatives rankings (representatives defined through clustering preferences)**





## *Preferences for Sharing Distributed Content*

Used preferences in

- **Keyword search in relational databases**
- **Publish/subscribe systems**



## Preferences for Sharing Distributed Content

### Publish/Subscribe Systems

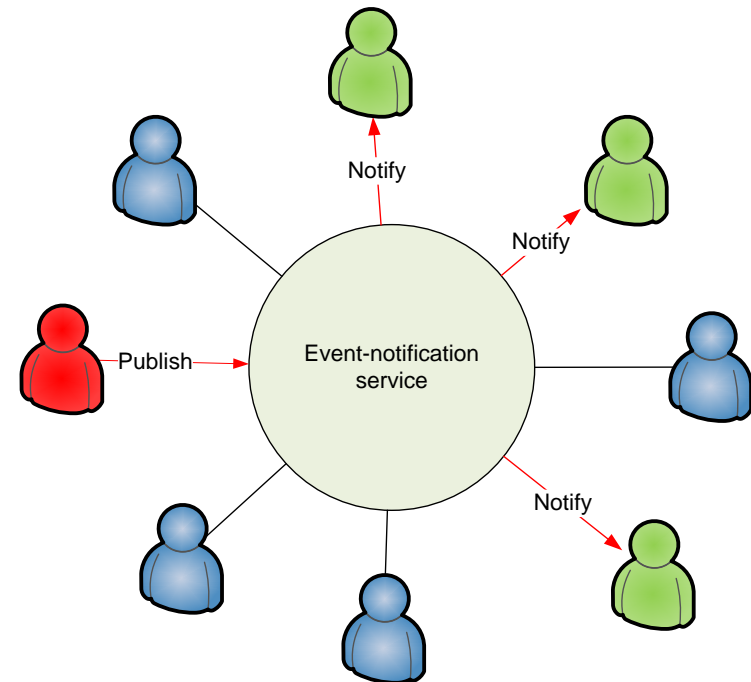
Publish/Subscribe offers an attractive alternative to typical searching

Users do not need to repeatedly search for new interesting data

They specify their interests once through **subscriptions** and get notified by the system whenever data that match their subscriptions are **published**

#### Examples:

- Google Alerts
- Twitter
- Microsoft BizTalk Server



## Preferences for Sharing Distributed Content

### Why Preferential Pub/Sub?

Typically, all subscriptions are considered **equally important**

But, users may receive:

- overwhelming amounts of notifications
- too much overlapping information
- In such cases, users would like to receive only a fraction of notifications, the **most interesting** ones:
  - **Current publish/subscribe systems do not allow users express different degrees of interest**



## Preferences for Sharing Distributed Content

### Preferential Pub/Sub

Extend subscription with preferences: users define *priorities* or degrees of interest on their subscriptions

**preferential subscriptions**

Use preferential subscriptions, we deliver to users only the ***k* most interesting (highly ranked)** events

**PrefSIENA:** We have extended SIENA to include preferential subscriptions and delivery based on ranking and diversity for the three delivery modes

- <http://www.cs.uoi.gr/~mdrosou/PrefSIENA>



## Preferences for Sharing Distributed Content

### Diversity

We wish to retrieve results on a **broader variety** of user interests

Two different perspectives on achieving diversity:

- **Avoid overlap**: choose events that are dissimilar to each other
- **Increase coverage**: choose notifications that cover as many user interests as possible

How to measure diversity?

- Many alternative ways
- Common ground: **measure similarity/distance among the selected items**



## ReDrive: Result-Driven Database Recommendations

We propose **assisting users in database exploration** by **recommending** to them additional items that are highly related with the items in the result of their original query. Our recommendations are based **solely on the result** of the user query.

### Our model:

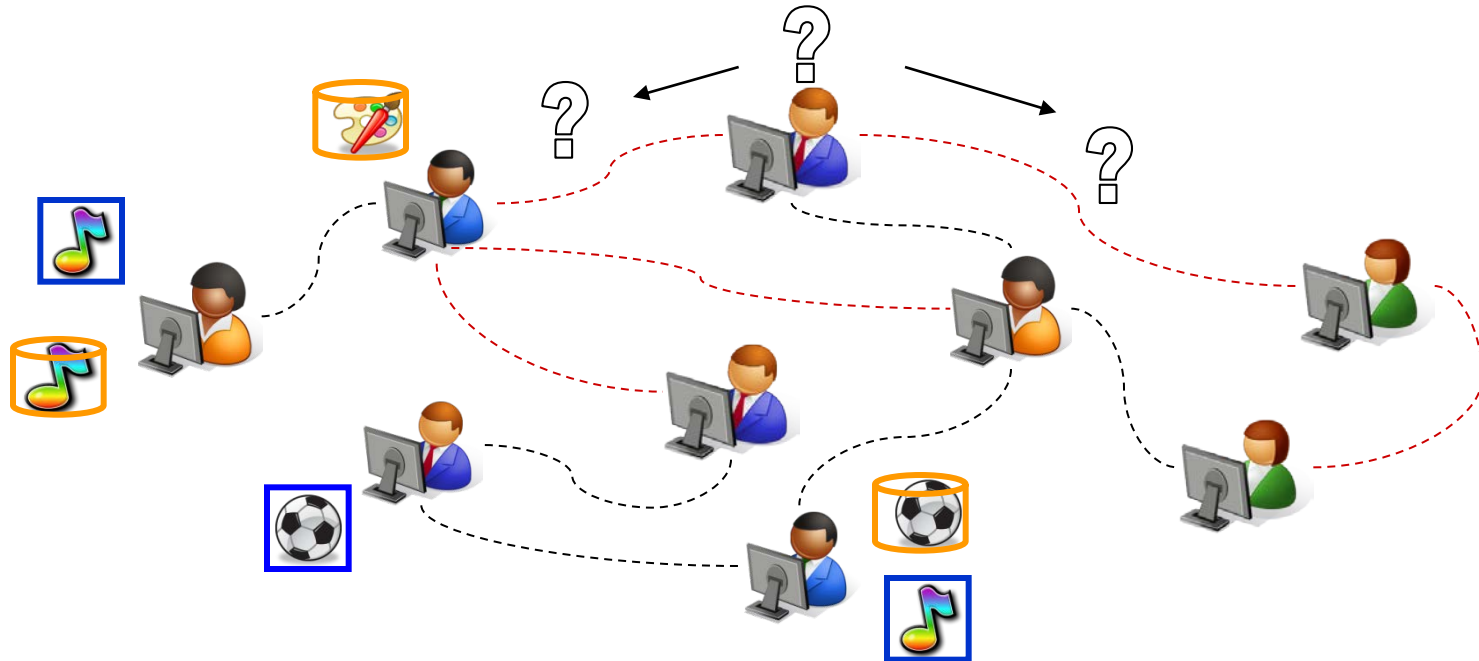
The computation of recommended results is based on the most interesting sets of (attribute, value) pairs, that appear in the result of the original user query. The **interestingness** of a faSet expresses how unexpected it is to see this faSet in the result.



- Context-aware preference models [**ACM TODS11, InformationSystems11, EDBT08, ICDE07 and others**]
  - extend preference models with a context component
- Preferential Publish/Subscribe [**DEBS09**]
  - Introduce ranking (top- $k$  delivery) in pub/sub
- Preferences and Keyword Search in Relational Databases [**EDBT10**]
- **You May Also Like Results** (YMAL) in Databases [**CIKM11, PersDB09**]
- Result Diversification [**SigmodRecord10, IEEE DBulletin09 and submission**]





## Overlays for Sharing Distributed Content



## Dynamic Content Sharing Systems: P2P, social networks

Peers:

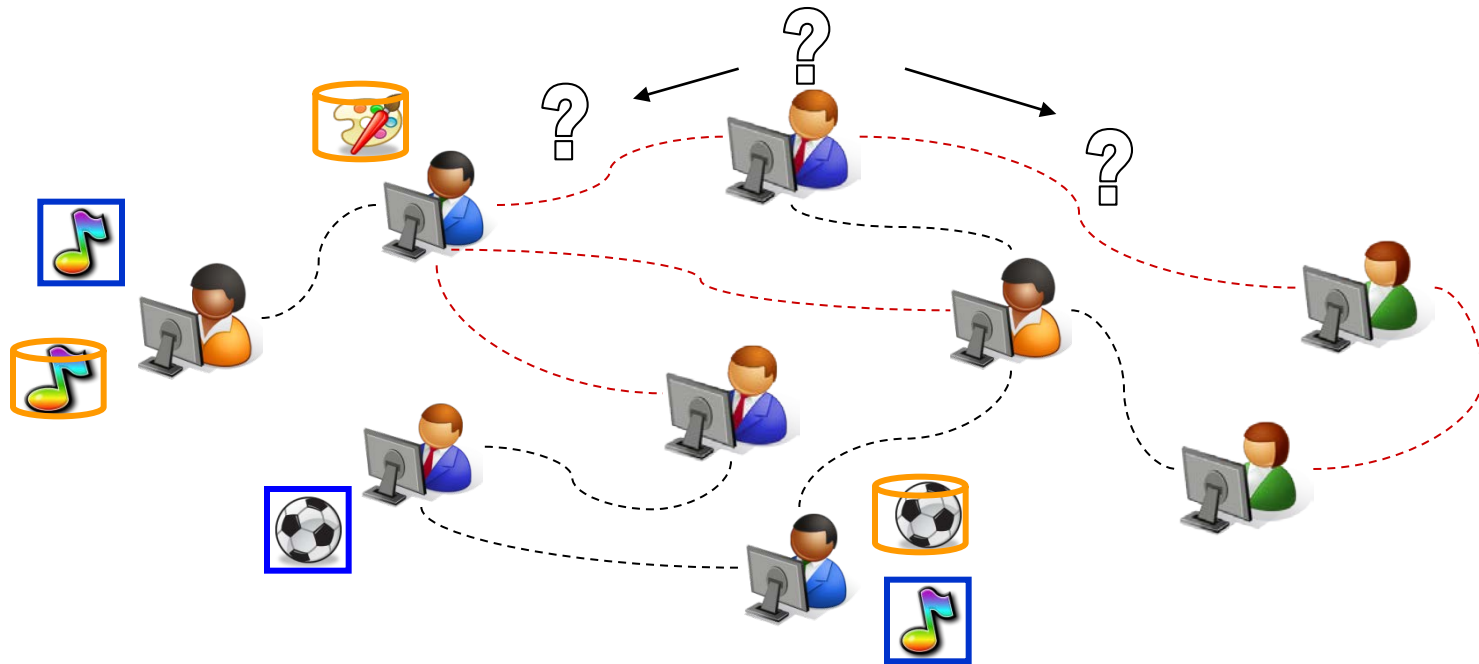
- Offer/Store content 
- Request/Query for content 





## Overlays for Sharing Distributed Content

### Overlay Networks



Peers connect with a subset of other peers

Overlay networks built on top of the physical networks



## Overlays for Sharing Distributed Content

### Our Work on Overlays

- **Distributed XPath over Distributed XML Collections [ICDE08, SIGMOD08, ICDE09, WWW10]**
  - Cooperative caching for XML: use a DHT-based cache for indexing or sharing cache [SIGMOD08]
  - Clustering for relaxation [ICDE08, ICDE09]
- Clustering overlays as a game [VLDB09]
- Duplicate elimination [CIKM11]



*Data Visualization, Graphics, Augmented Reality*

- Multidimensional data visualization and rendering [**Siggraph11 poster**]
- Animation [**SCA11, CAVW**]
- Reverse Engineering [**CAD**]
- 3D browsing and rendering and interacting using commodity and new generation smartphone hardware.



# Thank you!

