Supporting IT Service Information Management with Knowledge Graph

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### Background

- IT strategic outsourcing is the process of contracting IT related business functions to external service providers:

- Deal teams need to respond to potential clients’ request for proposals (RFS) by submitting a detailed technical solution in a bidding process:
Solution Information Manager (SIM)

- **Help in creating winning solutions by improving solution quality**
  - Tap into the full breadth knowledge and expertise available to create high quality solution
  - Facilitate the process of information exploration and knowledge sharing

- **Increase solutioning productivity to win more with available workforce**
  - Allow people to focus on creating values instead of spending too much time on searching
  - Help to derive insights from dense documentation spread across different repositories
  - Bring less experienced practitioners up to speed faster
Knowledge Graph

- A knowledge base that stores semantic search information gathered from a wide variety of sources in a graph structure

- Users are shown structured details about the search topic and links to other repositories that may be of interest.

- Users can find out everything they want without needing to look at multiple repositories to find the overall picture.

Interest graph

Knowledge graph

Graph search
A Conceptual Data Model for Knowledge Graph

Deal Attributes:
(meta info example)
Client: ABC
TCV: 50M
Date: 05/06/2013
Contract Len: 79d
Type: Addendum
Status: Completed
Outcome: No Bid
Sector: Industrial
OwningLOB: SO

Personal profile
Name: John Smith
Org: Global Tech Serv
Skills: Cloud, network
Experience:

Technical Solutions
Account Management
1) Solution Doc
2) Presentations
Midrange
Network
Security Offering

Risks
Winn Strategy
Offerings
Lessons learned
Assumptions

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A Data Model Implementation in Solution Information Manager (SIM)
System Architecture

Front-end UI

Keywords
Filters/facets

Source repositories
- Lotus Notes (Teamroom, minutes, slides)
- Internal Web Pages (lessons learned, tips)
- Community and Forum (proposal, news)
- DB2 Enterprise Information Warehouse
- Expert profile and connections

API

Index File

Search Query
Results

Indexer
Data Processor
Crawler

Knowledge Graph DB

Search and Recommendation Engine

clients
solutions
documents
...

Project

Document

Clients

Solutions

*Not real person information, for demonstration purpose only

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Leverage the relationships among document, deal, and people nodes in the knowledge graph. Each project is represented by a set of associated documents. Each person is also represented by a set of associated documents.

Linear computational cost: $O(n)$
Contextual Content Recommendation (Structured)

Wins
Offerings
Competitions
Assessments
Client Information
Presentation
Lessons Learned & Tips
Review and Approvals
Pricing
White Papers
Gartner Reports
Press and Newsletters

Knowledge Graph
Lucene
Search
Index

keywords: cloud

Compute relevance score directly against interested nodes and their context graph
Contextual Content Recommendation (Unstructured)

Attachments powerpoints

Header annotator

Table annotator

Annotated Unstructured Content

Knowledge Graph

Lucene

Search

Index

Keywords: cloud

Compute relevance score directly against interested nodes and their context graph
Demo: User Input Query

Solution Information Manager V2.0

Keywords: data center
Source: Financial Services
IMT: Customer: Competition: Outcome:

Natural language query

Search

Winning technical solutions done by John Smith with client XYZ
Winning technical solutions done by John Smith with client ABC
Winning technical solutions done by John Smith in 2013
Winning customer presentations done by John Smith

See more results for “Winning technical solutions for”
Demo: Simultaneous Expert, Document, and Deal Search
Demo: Simultaneous Expert, Document, and Deal Search
Demo: Contextual Content Recommendation

**Contextual Search**

![Solution Information Manager](image)

- **Title**: Resilency Example - Healthcare
  - **Date**: [ ]
  - **Source**: CES Handbook
  - **Rating**: (3 votes)

  to a client building a new data center to support...Resilient Data Center for Healthcare... Resilency Example - Healthcare., Nan Deck, Resilient Data Center... to a client building a new data center to support... : English - Resilient Data Center for Healthcare
Conclusions

- Empower information sharing in IT services with knowledge graph
  - Knowledge hub: 360 degree view of knowledge at a single site
  - Integrate the information from heterogenous resources
  - Transform existing structured and unstructured information into a user friendly knowledge base
  - Simultaneous Document, Expert, and Deal Recommendation
  - Contextual content recommendation

- Ongoing and Future work
  - Natural language query understanding
  - Knowledge graph security access control
    - Edge access control in querying facts stored in graph databases
  - Personalized recommendation
  - Large-scale graph indexing and search