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Graph Database

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SEAT
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Graph: model the interconnectivity of objects.

Definition (Graph)

A graph $G(V, E)$ has a set V of vertexes (nodes) and a set E of edges. Each edge $e \in E$ connects two nodes in V.

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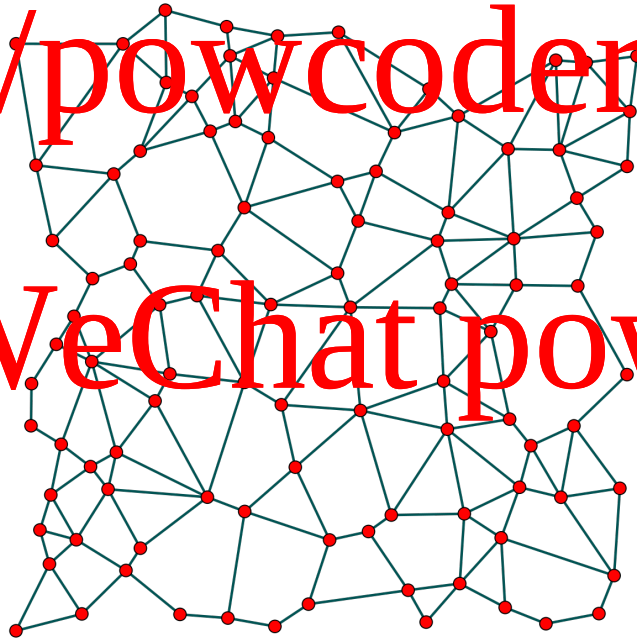

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Social Network

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Road Network

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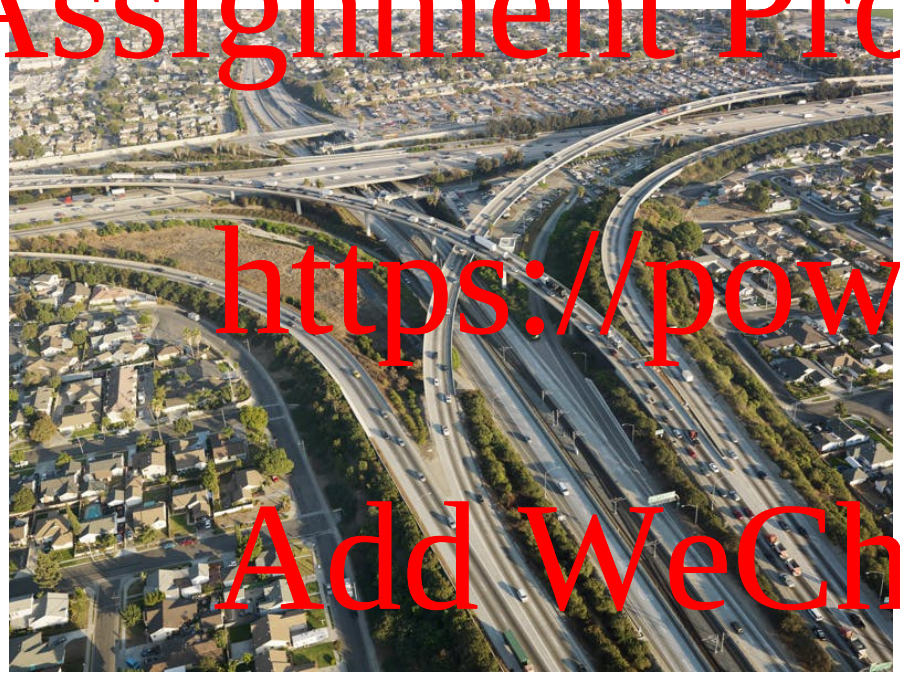

Metabolic Network

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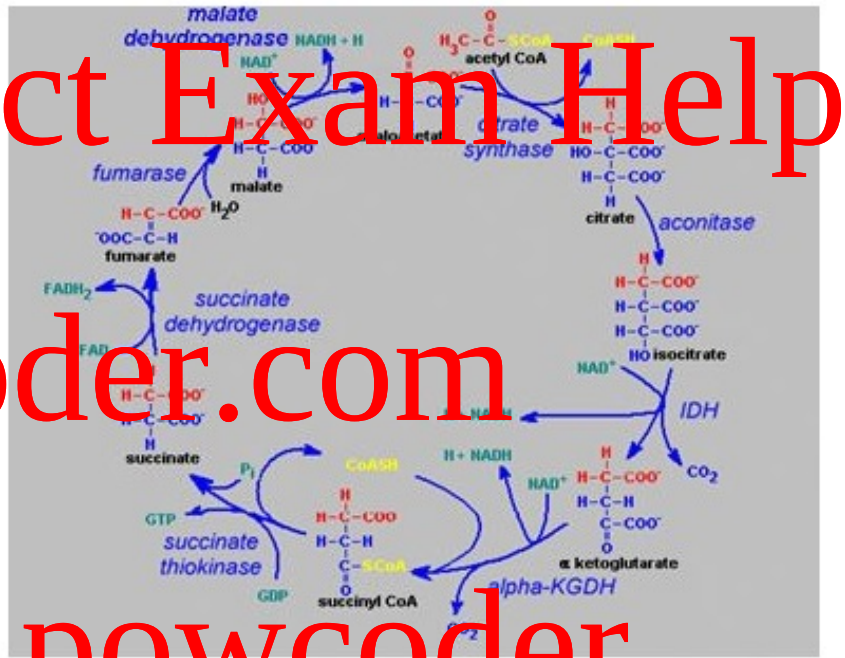
KEGG database: http://www.genome.ad.jp/kegg/kegg2.html



- *Nodes* – metabolites (0.5K).
- *Edges* – *directed* biochemichal reactions (1K).
- Reflect the cell's metabolic circuitry.

Other Networks

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- Internet graph.
- Communication networks.
- Distribution networks.
- etc.

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Graph is a general tool for modelling the interconnectivity of the objects in the real world.

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A graph can be extremely large.

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See `http://law.di.unimi.it/datasets.php`.

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Graph Queries

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- Path Query.

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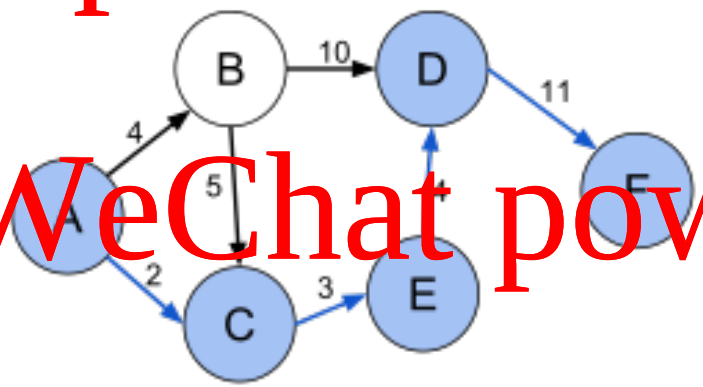

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Graph Queries

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- Path Query.
- Pattern Query.

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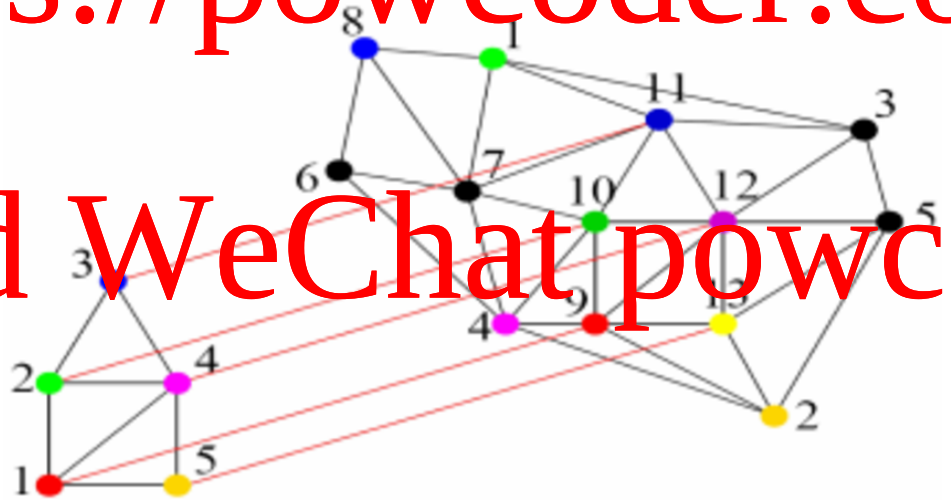

Graph Queries

- Path Query.
- Pattern Query.
- Analytical Query.

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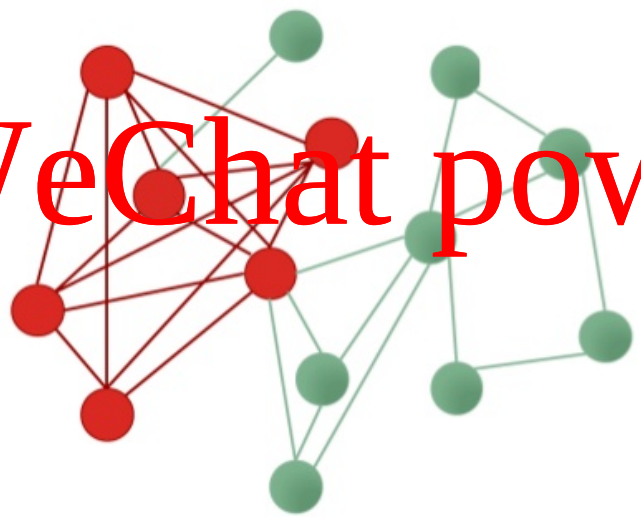

Graph Queries

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- Path Query.
- Pattern Query.
- Analytical Query.
- ...

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Graph Queries

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- Path Query.
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- ...

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Many graph queries can hardly be expressed in SQL and evaluated under RDBMS.

Graph data: semi-structured data

- Self-describing data.

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Movie (IMDB):

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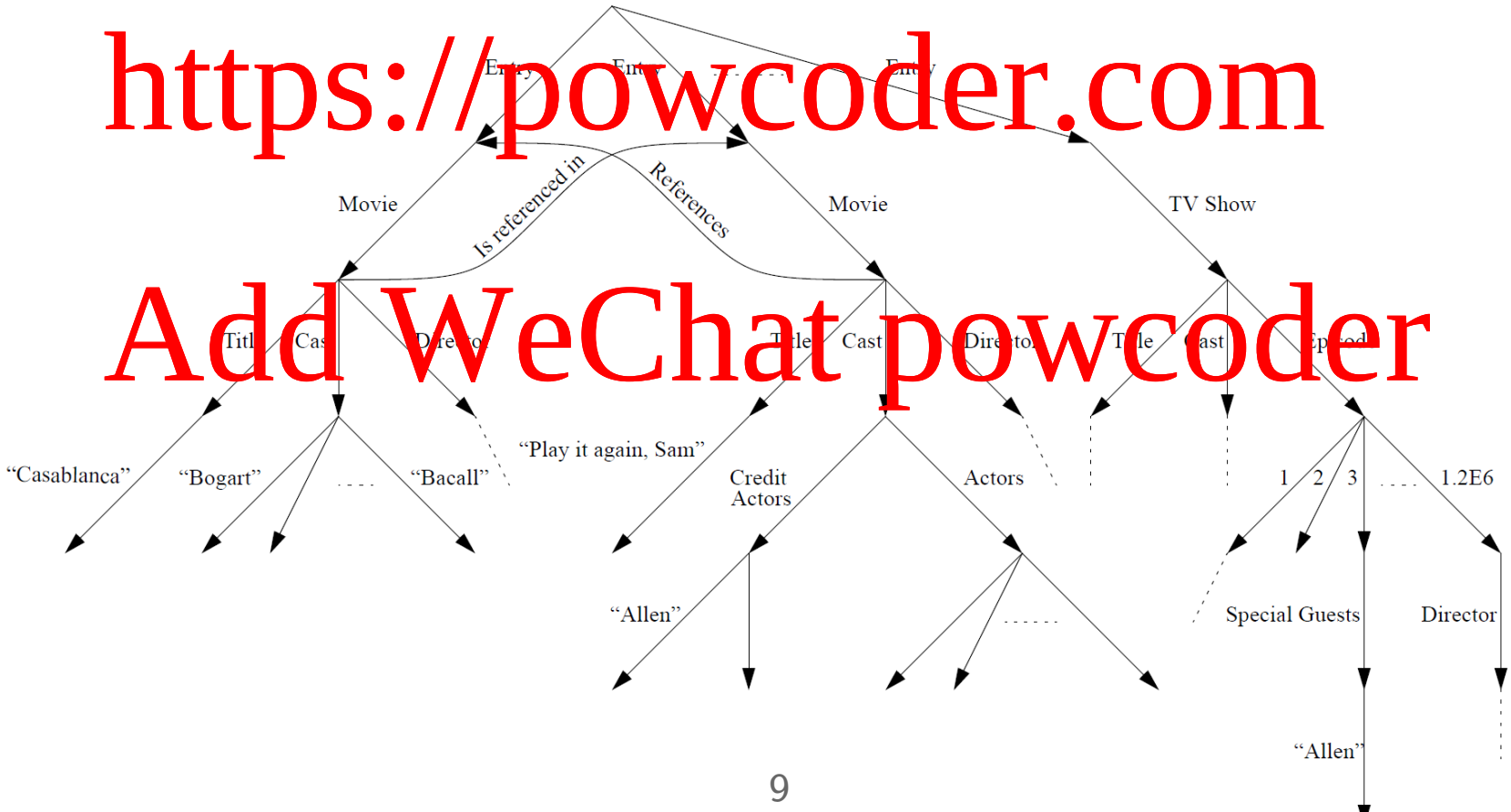

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Graph data: semi-structured data

- Self-describing data.
- Document/text attached on nodes/edges.

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Web graph: webpages and their hyperlinks

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Graph data: semi-structured data

- Self-describing data.
- Document/text attached on nodes/edges.
- Queries can be more complicated.

Who worked in both the team of "Casablanca" and "Play it again, Sam"?

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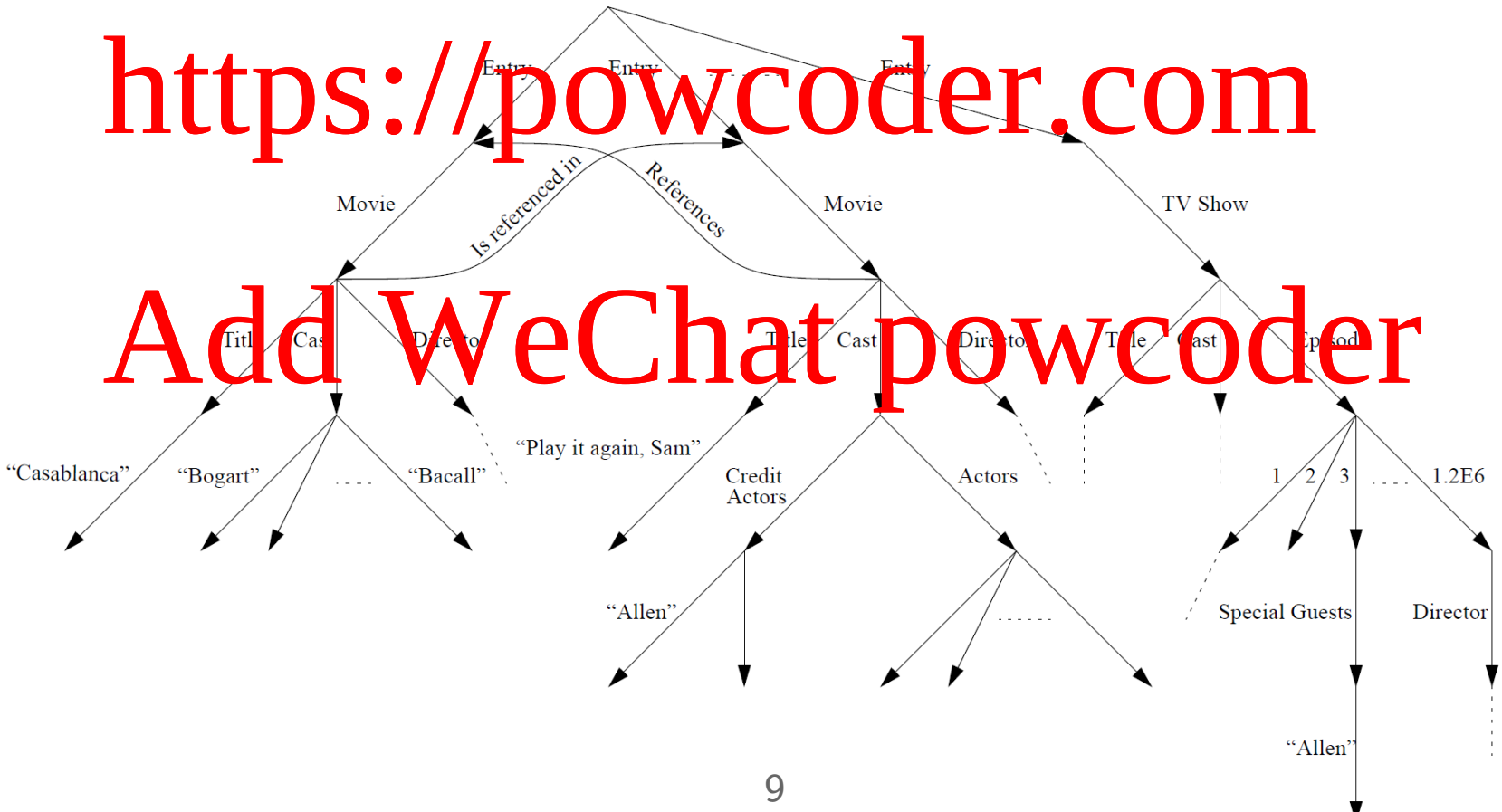

Graph Databases

Motivation:

- Graph is a general tool for modeling the interconnectivity of the objects in the real world.
- Real world graphs can be extremely large.
- Graph queries are computational expensive.
- Graph data: semi-structured data.

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Graph Databases

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Motivation:

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Aim: to understand and to use

- General graph database Neo4J.
- RDF graphs with their query language SPARQL.