

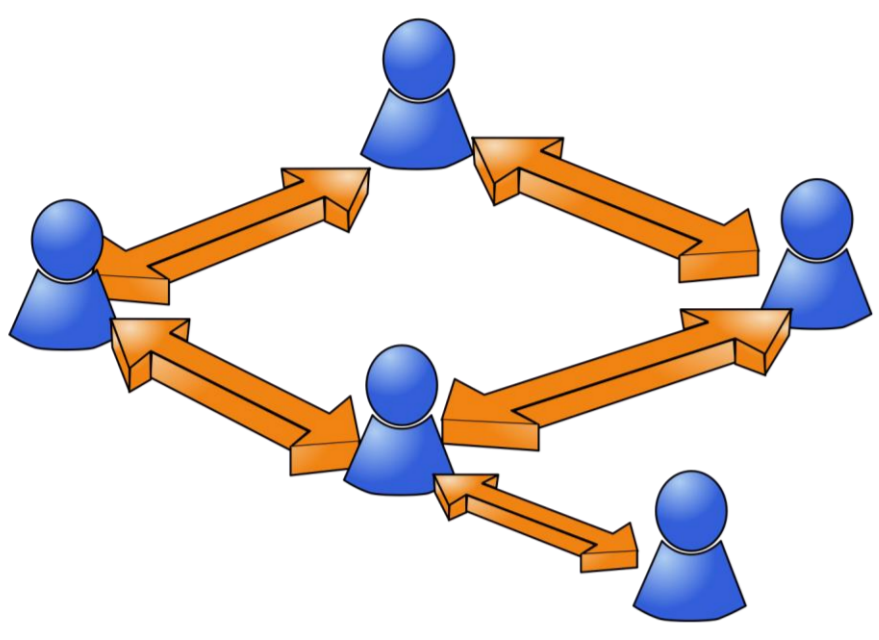
Design and Implementation of LinqSpace

Masterstudium:
Medizinische
Informatik

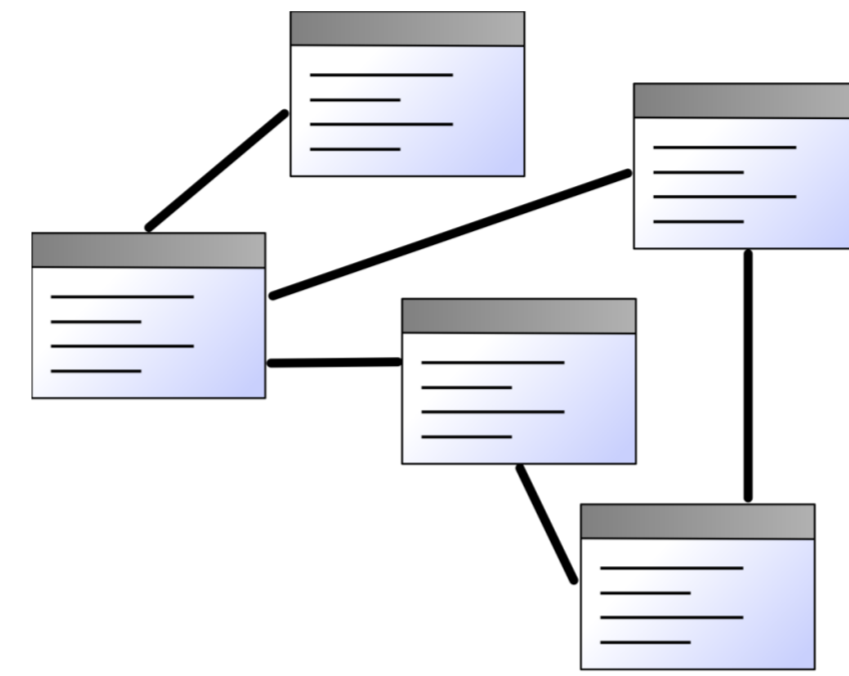
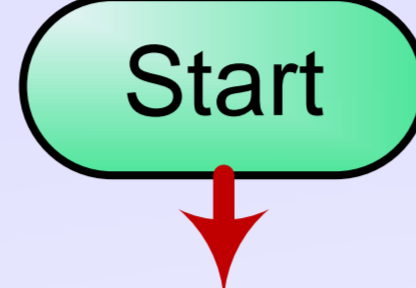
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Motivation



easy communication and coordination of distributed processes



- software projects often rely on complex problem domains [1]
- the entity-relationship model (ERM) should be maintained for inter-process communication

Technique & Challenges

Database: LinqSpace bases on conventional relational databases and benefits from:

- locking semantics and isolation levels
- persistent storage
- security
- data integrity and consistency

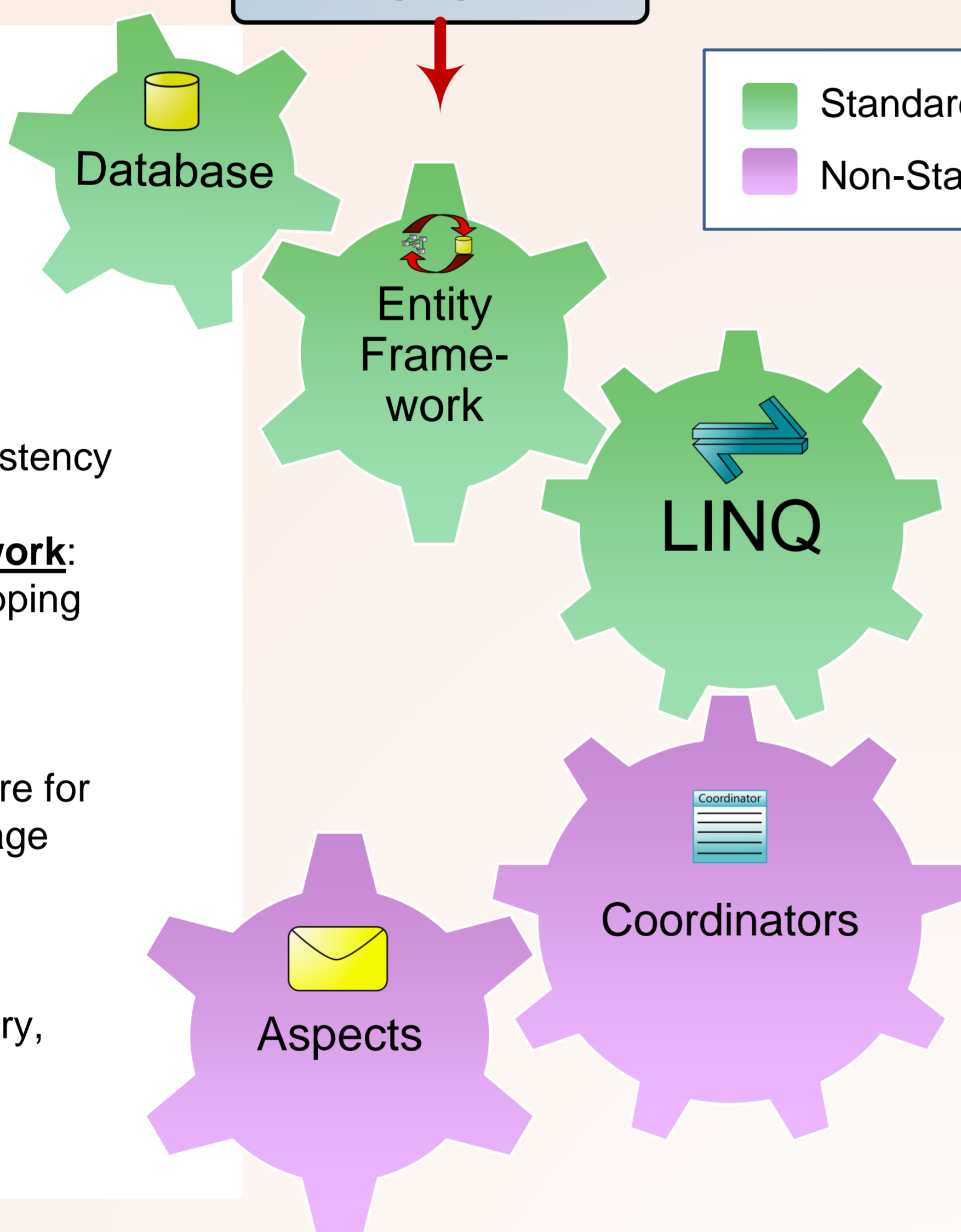
ADO.NET Entity Framework: is an object-relational mapping framework supporting:

- change tracking
- deferred loading
- three layered architecture for conceptual model, storage model and mapping

LINQ: Language **I**ntegrated **Q**uery, component for universal, type-safe data inquiry

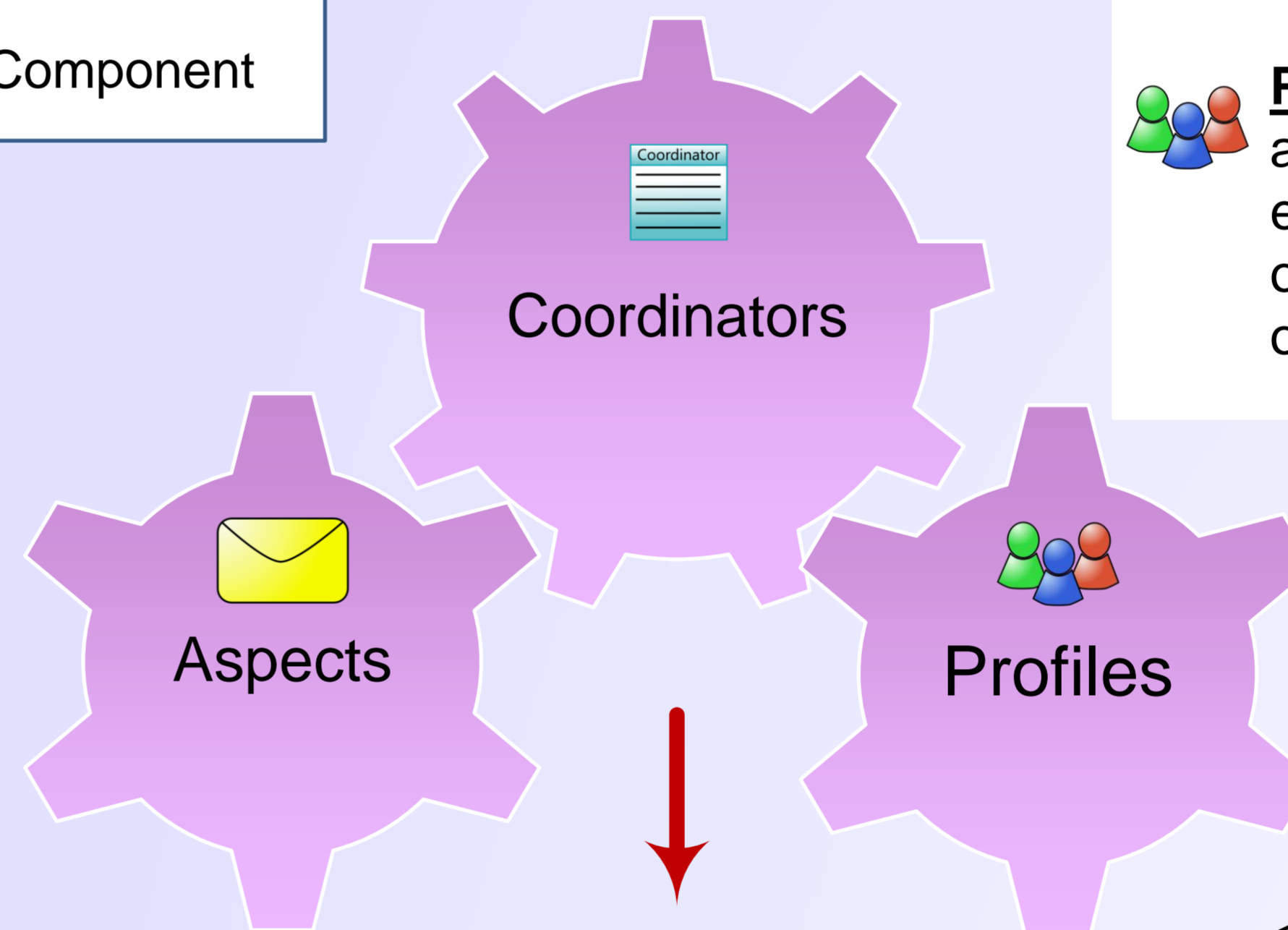
- coordination directly on the domain model
- flexible and descriptive LINQ queries
- ER-Modell can be maintained without modifications
- SBC paradigms supported
- additional database typical behaviors: persistence, data constraints, aggregate functionality and security

LinqSpace



Choose
Middleware

XVSM [2]



Coordinators: represent interaction, ordering (FIFO, LIFO) and filter policies (query, key or template based)

Aspects: are triggered before or after main interaction operations

Profiles: can be considered as a bundle of aspects and extensions to achieve a specific overall functionality like security or logging

Standard Component
Non-Standard Component

- relationships between entities are not supported
- additional considerations
- ER-Modell redesign

... and we can preserve our existing database infrastructure

The domain model must be modified in order to be represented by coordinators. Policies that cannot be covered by standard coordinators require custom coordinator implementations which are not easily replaceable if rules change

Results

- The combination of LINQ, databases and the EF results in an interesting mixture for a new XVSM reference implementation.
- Completely new opportunities whose extents still have to be evaluated:
 - persistent data storage
 - data replication
 - large amount of entries
 - powerful and versatile query language (LINQ)
 - querying a domain model
- Problem of mapping Coordinator information into a database. Separation into a distinct table requires an expensive JOIN operation to cross-reference the entities.

Usage scenarios

XVSM

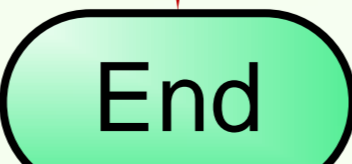
- persistent and relational data storage is not required
- performance critical applications
- event-driven design

LinqSpace

- mostly overlap with relational database usage scenarios
- additional support for notifications, even-driven architecture and coordinators



Yes



References:

- [1] JARZABEK, Stan. *Domain model-driven software reengineering and maintenance.*: Journal of Systems and Software, Volume 20, Issue 1, Pages 37-51, 1993.
[2] DÖNZ, Tobias. *Design and Implementation of the next Generation XVSM Framework: Runtime, Protocol and API.* Vienna: Vienna University of Technology, Institute of Computer Languages, 2011.