

# Formulaire - MAC

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**Impedance Mismatch Objet-Relationnel** Disconnect between data layer and application layer

- Solutions: *ORM*, *NoSQL*

## NoSQL

- Horizontal scaling
- No schema, fields can be added later
- Easy replication
- Simple API
- Not ACID

## Column oriented

- Écriture à grande échelle
- Accès aux données co-localisé (pour la lecture et l'écriture)

## Key-value

- Caches
- Domaine simple avec accès en lecture rapide
- Systèmes massivement concurrents
- Opaque value

## Document oriented

- Suited for agile dev.
- When data modeling follows the structures of natural documents
- No need for migration schema
- No need for ORM layer
- Replicated, each document is independent
- Separation approach: normalized data
  - + Data consistency through a single canonical source
  - + Simpler queries (closer to relational databases)
  - + Better cache efficiency and hardware utilization
  - – Requires multiple lookups and joins
  - – Forced consistency may be undesirable in some contexts
- Imbrication approach: unnormalized data
  - + Faster access (no joins, single document retrieval)
  - + Fewer failure points in distributed systems
  - + Simpler application logic
  - – Risk of data inconsistency due to redundancy
  - – More complex queries on nested data
  - – Larger, heavier documents

## Models

- Represent n-to-m relations
  - document model: *difficult*
  - relation model: *easy*
- Optional fields
  - document model: *possible*
  - relations model: *not possible*

## Couchbase

TODO Couchbase indexes

## Graph

- Interconnected data

- When the domain can be represented by nodes and relations
- Social media, recommendation engines
- Relational DBs compute the relations during the query, graph DBs store them.
- Native: custom underlying storage
- Non-Native: underlying relational DB
- **Index-free adjacency**: the relations are stored

## CAP Theorem

### Partition Re-equilibration

### Réplication maître-esclave

### Réplication peer-to-peer

### Index Free Adjacency