Polyglot Persistence with NoSQL

Advanced software architecture by using multiple persistence technologies
SELECT * 
FROM dbo.Presentation 
WHERE Title LIKE 'Polyglot pers%'
Our holy cow!
One size fits all
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.Net enterprise and cloud applications

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Data(base) architectures, BI and Big Data
Borat @BoratNoSQL

Why should I change? It worked for me until now!
Listen to the business
RDBMS

Volume

Velocity

Variability

Agility
Borat @BoratNoSQL
Sounds plausible, but what options do we have?
Increasing performance through scale out
Scaling by sharding

Roger Federer
N. Djokovic

Andy Murray
Rafael Nadal
Scaling by replication
Impedance mismatch using relational databases

```csharp
public class BlogPost
{
    public int Id { get; set; }
    public string Content { get; set; }
    public List<string> Tags { get; set; }
}
```

**BlogPost**
- Id (int)
- Content (varchar)

**Tag**
- Id (int)
- BlogPostId (int)
- Name (varchar)
Design for the relational model

```csharp
public class BlogPost
{
    public int Id { get; set; }
    public List<Tag> Tags { get; set; }
}

public class Tag
{
    public int Id { get; set; }
    public BlogPost BelongsTo { get; set; }
    public string Name { get; set; }
}
```
NoSQL databases increase productivity

```csharp
var post = new BlogPost
{
    Id = 1,
    Content = "Any text content",
    Tags = new [] { "NoSQL", "Cloud", "PolyglotPersistence" }
};

collection.Insert(post);
```
Data integrity cannot be enforced
NoSQL databases are eventual consistent
We look for a hotel room

Free

NY

Free

ZH
We book the room
Inconsistency window

booked
NY

Inconsistency

Free
ZH
Someone else books the same room

- NY: booked
- ZH: Free

Inconsistency
Conflict!

Inconsistency

booked
NY

booked
ZH
Why not handle such cases by business?
performance

consistency
What do we have in our toolbox?
A lot of database products
I feel swamped, how can I differentiate these products?
Key-value stores
Document stores
The document store data model

```json
{
    "playerId": 1,
    "firstName": "Roger",
    "lastName": "Federer",
    "ranking": "#1",
    "address": { "city": "Wollerau" }
    "sponsors": [ 
        {
            "id": 1,
            "name": "Nike",
            "amount": "16’000 SFR"
        },
        {
            "id": 2,
            "name": "Lindt",
            "amount": "5’000 SFR"
        },
        {
            "id": 3,
            "name": "Credit Suisse",
            "amount": "13’000 SFR"
        }
    ]
}
```
Column-family stores
The column-family data model

<table>
<thead>
<tr>
<th>Column-Family: Players</th>
<th>Column-Family: Fruits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FirstName: Roger</td>
</tr>
<tr>
<td></td>
<td>LastName: Federer</td>
</tr>
<tr>
<td>Row 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FirstName: Andy</td>
</tr>
<tr>
<td></td>
<td>LastName: Murray</td>
</tr>
<tr>
<td>Row 3</td>
<td></td>
</tr>
<tr>
<td>NickName: Rafa</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LastName: Nadal</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Row n-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruit: Apple</td>
</tr>
<tr>
<td></td>
<td>Price: 1.40$</td>
</tr>
<tr>
<td>Row n</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruit: Cherry</td>
</tr>
<tr>
<td></td>
<td>Price: 2.60$</td>
</tr>
</tbody>
</table>
Graph databases
The graph data model

Node [1]
Name = 'John'

Node [2]
Name = 'Sara'

Node [3]
Name = 'Maria'

Node [4]
Name = 'Steve'

Node [5]
Name = 'Joe'

friend

friend

friend

friend
Decisions, decisions…
With every database I have to take tradeoffs into account, I don’t want to choose only one!
Polyglot – Adjective
Knowing or using several languages

Persistence – Noun
The continued or prolonged existence of something
Polyglot persistence illustrated

- Retail Store
  - Product Catalog: Raven DB
  - Financial Data: MSSQL
  - Shopping Cart: Redis
  - Recommendations: Neo4J
Borat @BoratNoSQL
Sounds great! But where is the catch?
We need appropriate skills
Invest in software architecture
Integration databases have been used for years
Polyglot persistence doesn’t work here
Application databases do not share its data
Borat @BoratNoSQL
Fine! But I have not only one application.
Application database with SOA

Application A

Database 1

Service

Application B

Database 2
It’s all about layers
Well known layers

Presentation Layer

Domain Layer

Resource Access Layer (Data Access Layer)

Resources
Common data tier design

Presentation

User Interface

Domain

Object-Relational
Relational-Object

DAL

Search
Caching
Triggers
Transactions
Blobs
Reporting

Resources

RDBMS
The truth of reusability
Data access with reusable and seamless services

Presentation

Domain

DAL

Resources

User Interface

Search

Caching

Batch

Transactions

Blobs

Reporting

Key-Value

Document

RDBMS
Putting all together

User Interface

Middle Tier

Domain Services

Caching

Search

Reporting

Database Tier

Key-Value

Document

RDBMS
Use the right tool!
Resources

NoSQL Distilled
Author: Martin Fowler, Pramod J. Sadalage
ISBN: 978-0321826626

Making Sense of NoSQL
Author: Dan McCreary, Ann Kelly
ISBN: 978-1617291074

Links
http://nosql-database.org/
http://en.wikipedia.org/wiki/NoSQL
Thank you!