Working with NoSQL

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Non-relational Database

Commonly referred to as NoSQL

A group of many different data stores

NoSQL Databases

Key-value store or Key-value cache

Document store or Document database

Object storage

Table storage

Graph database

NoSQL Databases in This Module

Document database
JSON serialized data

Key-value store
Persistent dictionary

Table store
Tabular data, often terabytes of it

NoSQL or **Relational** Database

A relational database engine enforces relationships

Relational data is not verified by the NoSQL database engine

Data in NoSQL is accessed through keys

Can be used to define a relationship but this will **NOT** be enforced

Document Database

Store documents

JSON, XML, or other supported formats

All data in one place

Useful to store entities with all its related data in one place

Example: Document in a Document Database

```
{
  "InvoiceId": "IN123",
  "CustomerId": "1",
  "Due": "2025-01-01",
  "Items": [],
  "Total": 1999.50
}
```

Invoice

```
public class Invoice
{
   public string InvoiceId { get; set; }
   public Guid CustomerId { get; set; }
   public DateOnly Due { get; set; }
   public IEnumerable<Item> Items { get; set; }
   public decimal Total { get; set; }
}
```

Access a Document

Partition Key

A good partitioning leads to better scaling

Row Key

The key for the row in the specified partition

NoSQL databases are **often** very **fast** and **scalable**

Key Value Store

Dictionary

JSON, binary, simple or complex types

Good for caching!

It’s used like a hosted, scalable dictionary to cache data

Redis is a common key value store

Feature Toggle

```
// Ask the Key Value Store for a Boolean value
if(FeatureService.IsEnabled("Order_Page_2.0"))
{
    ...
}
```

Table Store

Tabular data

Looks like any column from a traditional databse, without relationships

Good for LOTS of data

Not uncommon to be used for terabytes of data

Document Database Content

Partition Key
Use to determine in which partition to store the data.
A good partition key makes scaling easier and better.

Row Key
Commonly referred to as id and is used to index the data in a partition.
Has to be unique!

Data
The data serialized to a supported format. Commonly stored as JSON.

Distributed Cache (**Key Value Store**)

```
public string GetDetailsFor(string itemId)
{
    var details = database.StringGet(itemId);

    if (details.HasValue)
    {
        return details;
    }
    var loadedDetails = ... ;

    database.StringSet(itemId, loadedDetails);

    return loadedDetails;
}
```

Always access data through its key!

Not meant to be used to iterate through all cached items.

Introduce a (distributed) cache to store data that is frequently accessed

Redis is an in-memory cache

If the instance/server restart all data is lost.

Using the Distributed Cache (**Key Value Store**)

Available in the cache?

Load the data a

Data

The data serialized to a supported format. Commonly stored as JSON.

Using a Table Store

```
TableServiceClient tableServiceClient = new("CONNECTION STRING");

TableClient tableClient =
    tableServiceClient.GetTableClient("SupportRequests");

tableClient.CreateIfNotExists();

tableClient.AddEntity(...);
```

Access a Row in the Table

Partition Key

A good partitioning leads to better scaling

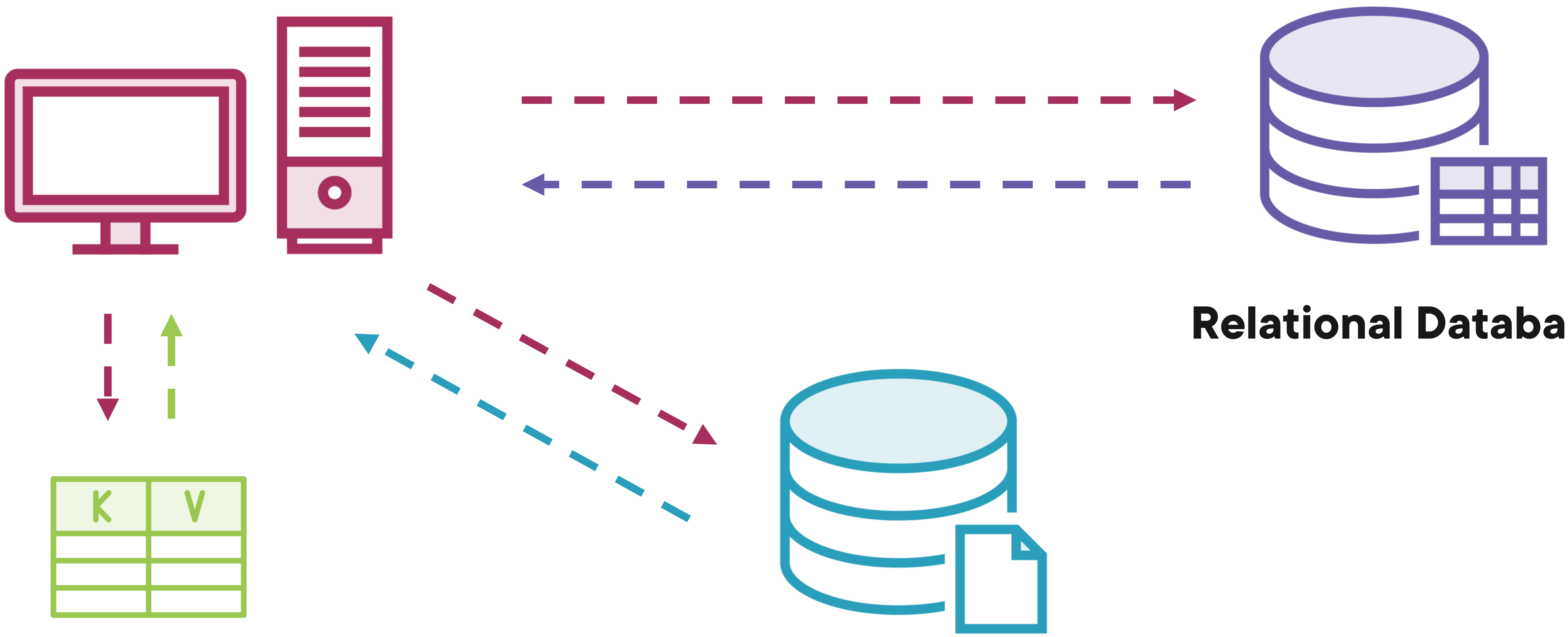
Row Key

The key for the row in the specified partition

Choose a partition key that evenly distributes your data

Warehouse identifier?
Customer Identifier?

Using More Than One Database

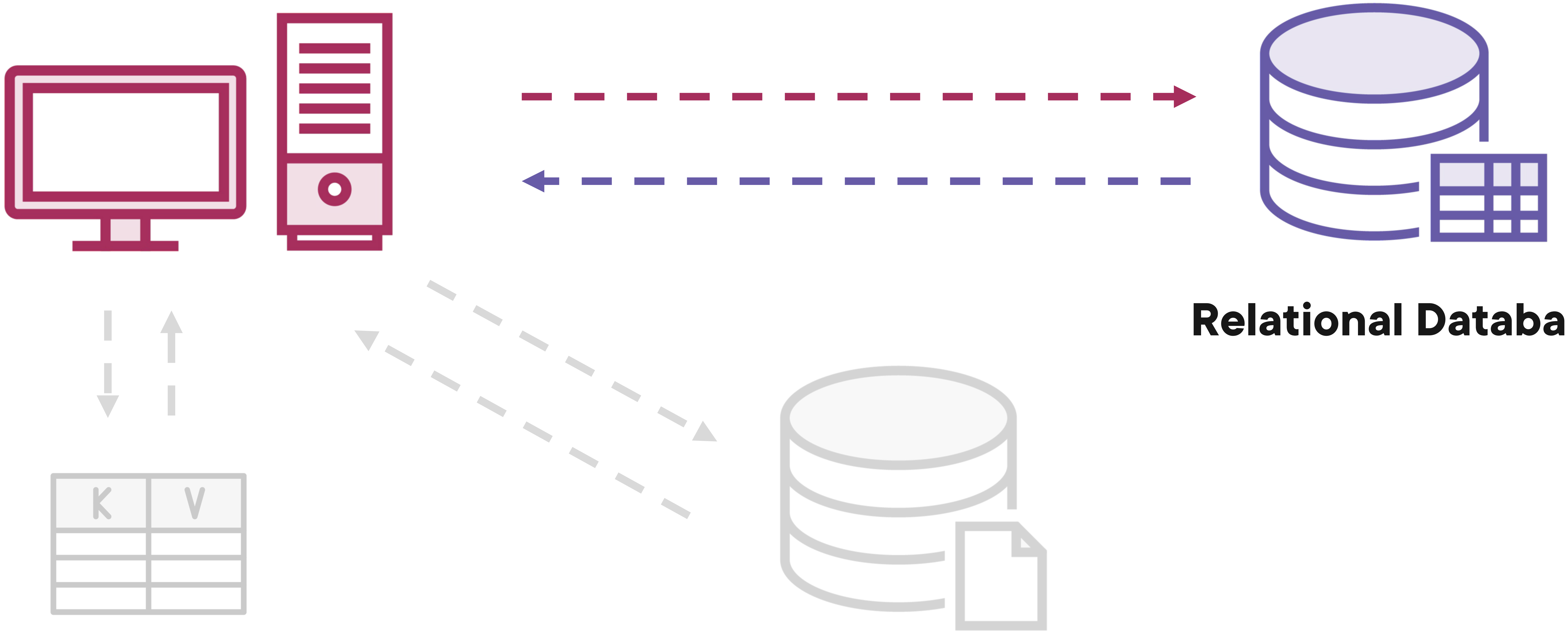


Relational Database

NoSQL: Key Value Store
(distributed cache cache)

NoSQL: Document Database

Using More Than One Database



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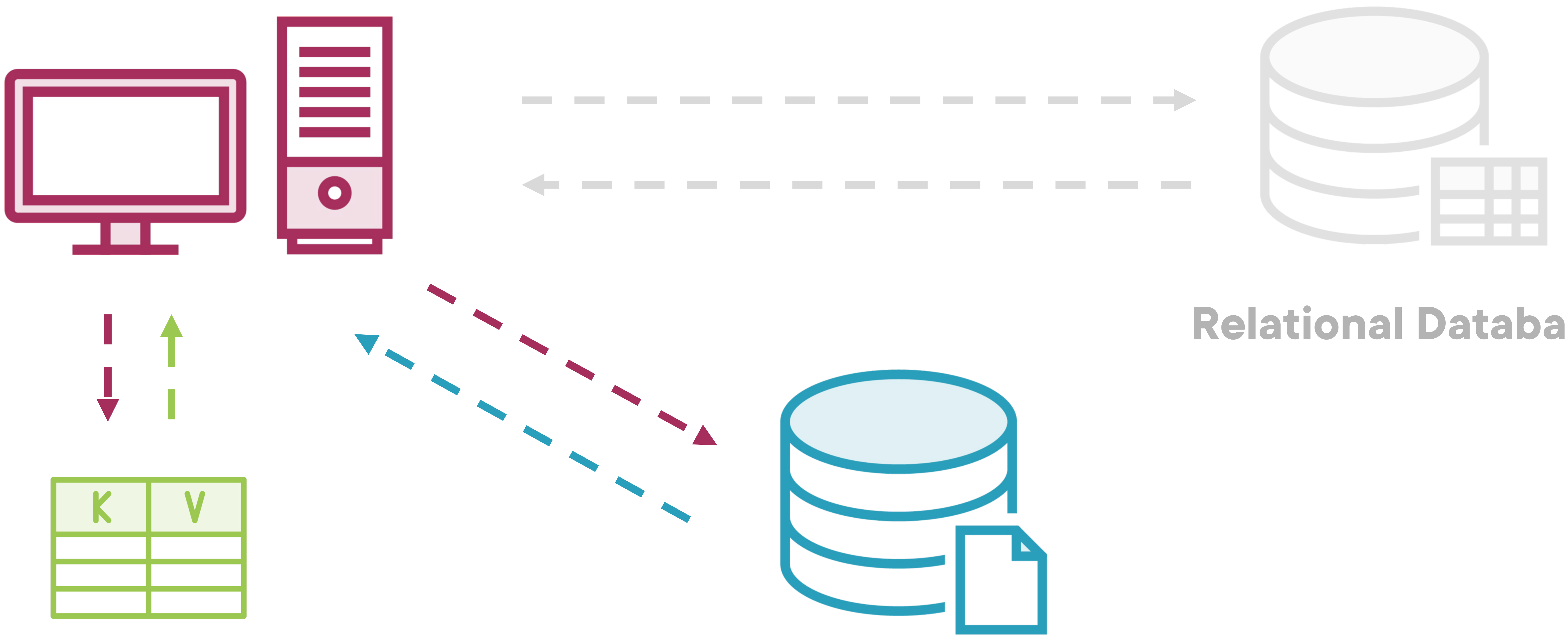

Relational Database

NoSQL: Key Value Store
(distributed cache cache)

NoSQL: Document Database

Cloud Hosted **NoSQL** Databases

Scalable

High performance

Know your pricing!

Always read the documentation to avoid unnecessary cost

Create a Document

```
using var client = new CosmosClient(
    accountEndpoint: "ADD THE ENDPOINT HERE",
    authKeyOrResourceToken: "ADD THE TOKEN HERE"
);

Database database =
    await client.CreateDatabaseIfNotExistsAsync("WarehouseManagementSystem");

Container container = await database.CreateContainerIfNotExistsAsync(
        id: "invoices",
        partitionKeyPath: "/customerId", throughput: 400);

await container.UpsertItemAsync(invoice);
```

Create a Document

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Automatically serializes data to json

There’s a lot more to explore!

Redis

In-memory key value store

Distributed cache

Using Redis

```
static ConnectionMultiplexer connection =
          ConnectionMultiplexer.Connect("CONNECTION STRING");

IDatabase database = connection.GetDatabase();

var cachedItem = database.StringGet(itemId);

if(cachedItem.HasValue)
{
    return cachedItem;
}

database.StringSet(itemId, "the data");
```

Using Redis

```
static ConnectionMultiplexer connection =
        ConnectionMultiplexer.Connect("CONNECTION STRING");

IDatabase database = connection.GetDatabase();

var cachedItem = database.StringGet(itemId);

if(cachedItem.HasValue)
{
    return cachedItem;
}

database.StringSet(itemId, "the data");
```

Add caching in hot paths to reduce load times!

Automatic Expiration of Cached Items

```
database.StringSet(itemId,
    "the data",
    expiry: TimeSpan.FromHours(1)
);
```

You can reference other data!

It will **not** be **enforced** by the database.

Table Store

Built for extreme amounts of data

Very fast

Using a Table Store

```
TableServiceClient tableServiceClient = new("CONNECTION STRING");

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```

Using a Table Store

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TableClient tableClient =
    tableServiceClient.GetTableClient("SupportRequests");

tableClient.CreateIfNotExists();
```

Using a Table Store

```
TableServiceClient tableServiceClient = new("CONNECTION STRING");

TableClient tableClient =
    tableServiceClient.GetTableClient("SupportRequests");

tableClient.CreateIfNotExists();

tableClient.AddEntity(...);

var requests = tableClient.Query<SupportRequest>(
                r => r.PartitionKey == customerId.ToString()
            );
```

You now have the tools to work with data access in your applications!