

Designing & Loading Slowly Changing Dimensions

by Martin Schoombee

About Me

“I help people make sense
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Agenda

- Dimension Basics
- Dimension (Not So) Basics
- Other Design Considerations
- Snow-Flake Schemas
- Inter-Dimensional Relationships
- Fact Relationships
- Demo

Slowly Changing Dimension?



Dimension Basics

Attributes

| EmployeeKey | EmployeeNumber | EmployeeName | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|---------------|---------------|-----------------|
| 121 | EF846 | Joe Soap | 1 | 1/4/2018 | 12/31/2100 |
| 435 | EF125 | John Doe | 0 | 1/1/2015 | 5/29/2017 |
| 1056 | EF125 | John Doe | 1 | 5/30/2017 | 12/31/2100 |

Surrogate Key

| EmployeeKey | EmployeeNumber | EmployeeName | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|---------------|---------------|-----------------|
| 121 | EF846 | Joe Soap | 1 | 1/4/2018 | 12/31/2100 |
| 435 | EF125 | John Doe | 0 | 1/1/2015 | 5/29/2017 |
| 1056 | EF125 | John Doe | 1 | 5/30/2017 | 12/31/2100 |

Business Key

| EmployeeKey | EmployeeNumber | EmployeeName | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|---------------|---------------|-----------------|
| 121 | EF846 | Joe Soap | 1 | 1/4/2018 | 12/31/2100 |
| 435 | EF125 | John Doe | 0 | 1/1/2015 | 5/29/2017 |
| 1056 | EF125 | John Doe | 1 | 5/30/2017 | 12/31/2100 |

Effective Dates

| EmployeeKey | EmployeeNumber | EmployeeName | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|---------------|---------------|-----------------|
| 121 | EF846 | Joe Soap | 1 | 1/4/2018 | 12/31/2100 |
| 435 | EF125 | John Doe | 0 | 1/1/2015 | 5/29/2017 |
| 1056 | EF125 | John Doe | 1 | 5/30/2017 | 12/31/2100 |

Current Flag

| EmployeeKey | EmployeeNumber | EmployeeName | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|---------------|---------------|-----------------|
| 121 | EF846 | Joe Soap | 1 | 1/4/2018 | 12/31/2100 |
| 435 | EF125 | John Doe | 0 | 1/1/2015 | 5/29/2017 |
| 1056 | EF125 | John Doe | 1 | 5/30/2017 | 12/31/2100 |

Defaults

| EmployeeKey | EmployeeNumber | EmployeeName | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|---------------|---------------|-----------------|
| -9 | -9 | Unknown | 1 | 1/1/1900 | 12/31/2100 |
| 435 | EF125 | John Doe | 0 | 1/1/2015 | 5/29/2017 |
| 1056 | EF125 | John Doe | 1 | 5/30/2017 | 12/31/2100 |

Type 0 – Retain Original

| DateKey | CalendarDate | CalendarYear | CalendarQuarter | CalendarMonth | CalendarWeek |
|----------|--------------|--------------|-----------------|---------------|--------------|
| 20190101 | 1/1/2019 | 2019 | 1 | 1 | 1 |
| 20190102 | 1/2/2019 | 2019 | 1 | 1 | 1 |
| 20190103 | 1/3/2019 | 2019 | 1 | 1 | 1 |

Type 1 – Update In-Place

Before

| EmployeeKey | EmployeeNumber | EmployeeName | EmploymentType | City | State |
|-------------|----------------|--------------|----------------|---------|-------|
| 121 | EF846 | Joe Soap | FTE | Phoenix | AZ |

After

| EmployeeKey | EmployeeNumber | EmployeeName | EmploymentType | City | State |
|-------------|----------------|--------------|----------------|----------|-------|
| 121 | EF846 | Joe Soap | FTE | Santa Fe | NM |

Type 2 – Track History

Before

| EmployeeKey | EmployeeNumber | EmployeeName | City | State | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|---------|-------|---------------|---------------|-----------------|
| 121 | EF846 | Joe Soap | Phoenix | AZ | 1 | 1/1/2018 | 12/31/2100 |

After

| EmployeeKey | EmployeeNumber | EmployeeName | City | State | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|--------------|----------|-------|---------------|---------------|-----------------|
| 121 | EF846 | Joe Soap | Phoenix | AZ | 0 | 1/1/2018 | 3/11/2019 |
| 653 | EF846 | Joe Soap | Santa Fe | NM | 1 | 3/12/2019 | 12/31/2100 |

Type 3 – Historic Values In Row

Before

| EmployeeKey | EmployeeNumber | EmployeeName | PreviousRegion | CurrentRegion |
|-------------|----------------|--------------|----------------|---------------|
| 121 | EF846 | Joe Soap | South-West | South-West |

After

| EmployeeKey | EmployeeNumber | EmployeeName | PreviousRegion | CurrentRegion |
|-------------|----------------|--------------|----------------|---------------|
| 121 | EF846 | Joe Soap | South-West | Mid-West |

Dimension (Not So) Basics

Type 4 – Mini Dimension

Before

| EmployeeKey | EmployeeNumber | EmployeeName | Region | Market |
|-------------|----------------|--------------|------------|------------|
| 121 | EF846 | Joe Soap | South-West | Enterprise |

After

| EmployeeKey | EmployeeNumber | EmployeeName |
|-------------|----------------|--------------|
| 121 | EF846 | Joe Soap |

| DemographicsKey | Region | Market |
|-----------------|------------|------------|
| 11 | South-West | Enterprise |

Type 5 – Type 4 + 1

Before

| EmployeeKey | EmployeeNumber | EmployeeName |
|-------------|----------------|--------------|
| 121 | EF846 | Joe Soap |

| DemographicsKey | Region | Market |
|-----------------|------------|------------|
| 11 | South-West | Enterprise |

After

| EmployeeKey | EmployeeNumber | EmployeeName | CurrentDemographicsKey |
|-------------|----------------|--------------|------------------------|
| 121 | EF846 | Joe Soap | 15 |

| DemographicsKey | Region | Market |
|-----------------|------------|------------|
| 11 | South-West | Enterprise |

| CurrentDemographicsKey | CurrentRegion | CurrentMarket |
|------------------------|---------------|---------------|
| 15 | South-West | Enterprise |

Type 6 – Type 2 + 3 + 1

Before

| EmployeeKey | EmployeeNumber | City | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|---------|---------------|---------------|-----------------|
| 121 | EF846 | Phoenix | 1 | 1/1/2018 | 12/31/2100 |

After

| EmployeeKey | EmployeeNumber | City | CurrentCity | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|----------|-------------|---------------|---------------|-----------------|
| 121 | EF846 | Phoenix | Santa Fe | 0 | 1/1/2018 | 3/12/2019 |
| 432 | EF846 | Santa Fe | Santa Fe | 1 | 3/13/2019 | 12/31/2100 |

Type 7 – Current & Historic Views

Before

| EmployeeKey | EmployeeNumber | City | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------|---------|---------------|---------------|-----------------|
| 121 | EF846 | Phoenix | 1 | 1/1/2018 | 12/31/2100 |

After

| EmployeeHistoryKey | EmployeeKey | EmployeeNumber | City | CurrentRecord | EffectiveDate | TerminationDate |
|--------------------|-------------|----------------|---------|---------------|---------------|-----------------|
| 121 | 12 | EF846 | Phoenix | 1 | 1/1/2018 | 12/31/2100 |

| EmployeeKey | EmployeeNumber | City |
|-------------|----------------|---------|
| 12 | EF846 | Phoenix |

Other Design Considerations

Naming Conventions

EmployeeNumber **vs.** Employee_Number

EmployeeNumber **vs.** EmployeeNr

EmployeeNumber **vs.** EmpNr

Audit Dates

| EmployeeKey | EmployeeNumber | EmployeeName | Region | Market | InsertDate | UpdateDate |
|-------------|----------------|--------------|------------|------------|-------------------------|------------|
| 121 | EF846 | Joe Soap | South-West | Enterprise | 2019-04-20 10:49:31.012 | NULL |

Labels

| EmployeeKey | EmployeeNumber | EmployeeName | EmployeeLabel |
|-------------|----------------|--------------|-----------------|
| 121 | EF846 | Joe Soap | EF846: Joe Soap |

Hash Values

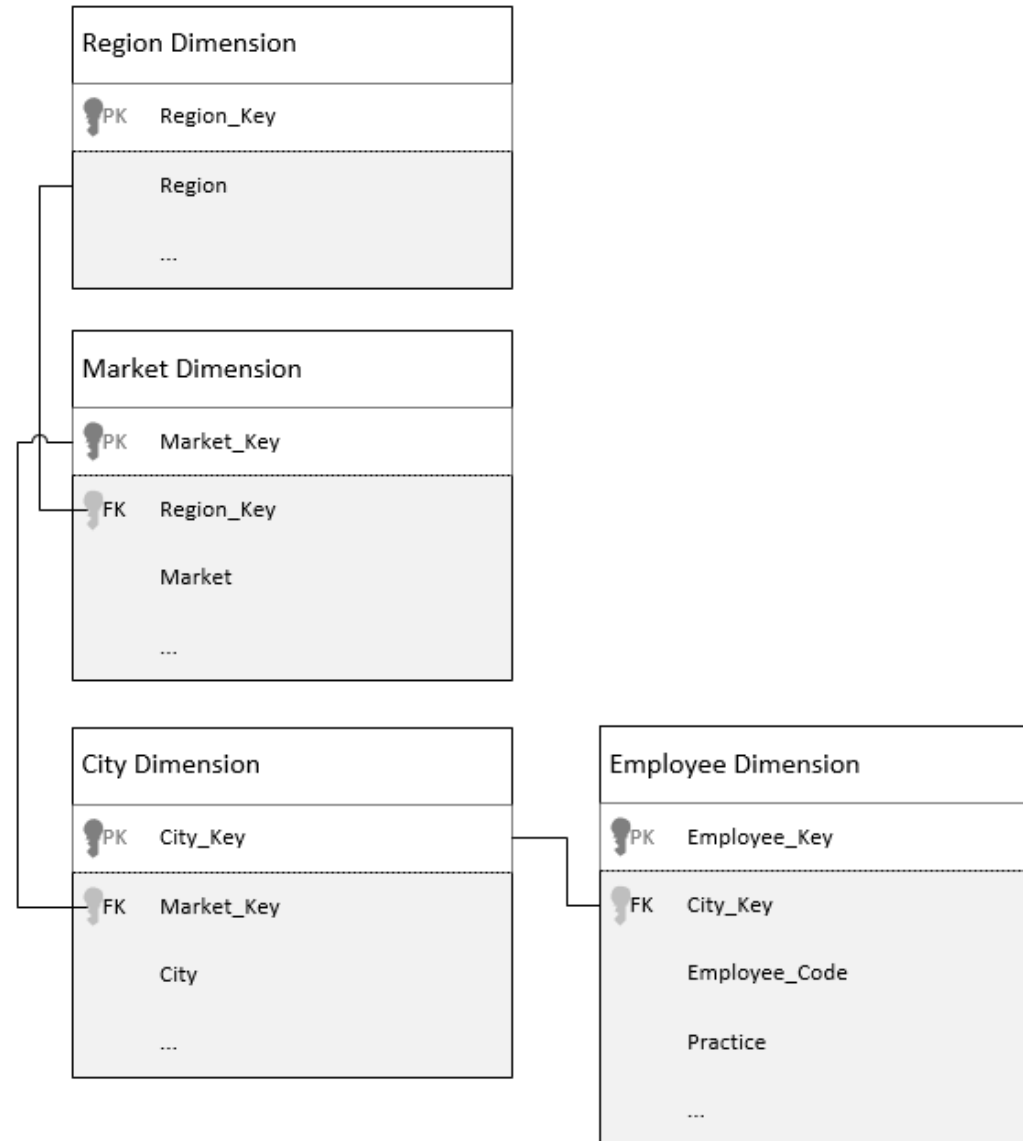
| EmployeeKey | EmployeeNumber | EmployeeName | Type1Hash | Type2Hash |
|-------------|----------------|--------------|---------------|---------------|
| 121 | EF846 | Joe Soap | 0xE17BB70C9C5 | 0x76D203FA64E |

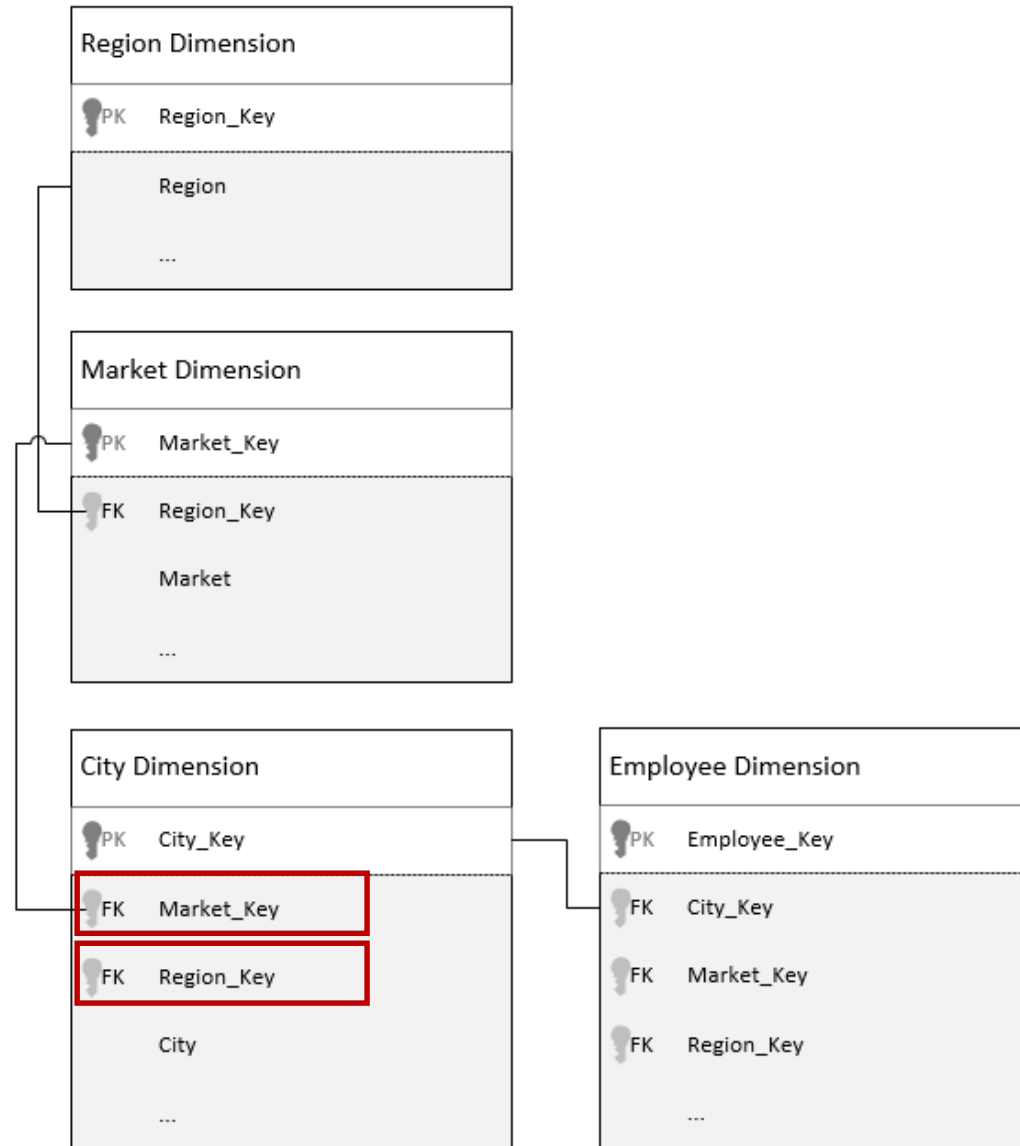
Persisted/Durable Keys


| EmployeeKey | PersistedEmployeeKey | EmployeeNumber | EmployeeName | State | CurrentRecord | EffectiveDate | TerminationDate |
|-------------|----------------------|----------------|--------------|-------|---------------|---------------|-----------------|
| 121 | 121 | EF846 | Joe Soap | AZ | 0 | 1/1/2018 | 3/11/2019 |
| 653 | 121 | EF846 | Joe Soap | NM | 1 | 3/12/2019 | 12/31/2100 |


Snowflake Schemas








| Region Dimension | |
|--|------------|
|  PK | Region_Key |
| Region_Code | |
| ... | |

| Market Dimension | |
|--|------------|
|  PK | Market_Key |
| Region_Code | |
| Market_Code | |
| ... | |

| City Dimension | |
|---|----------|
|  PK | City_Key |
| Market_Code | |
| City_Code | |
| ... | |

| Employee Dimension | |
|--|--------------|
|  PK | Employee_Key |
| City_Code | |
| Market_Code | |
| Region_Code | |
| ... | |


Inter-Dimensional Relationships


One-To-Many (1:M)



| Employee Dimension | |
|--|--------------|
|  PK | Employee_Key |
| Employee_Code | |
| Organizational_Unit | |
| Practice | |
| ... | |
| Effective_Date | |
| Termination Date | |
| Current_Record | |

| Project Dimension | |
|--|-------------|
|  PK | Project_Key |
| Project_Number | |
| Employee_Code_PM | |
| ... | |
| Effective_Date | |
| Termination Date | |
| Current_Record | |

Many-To-Many (M:M)

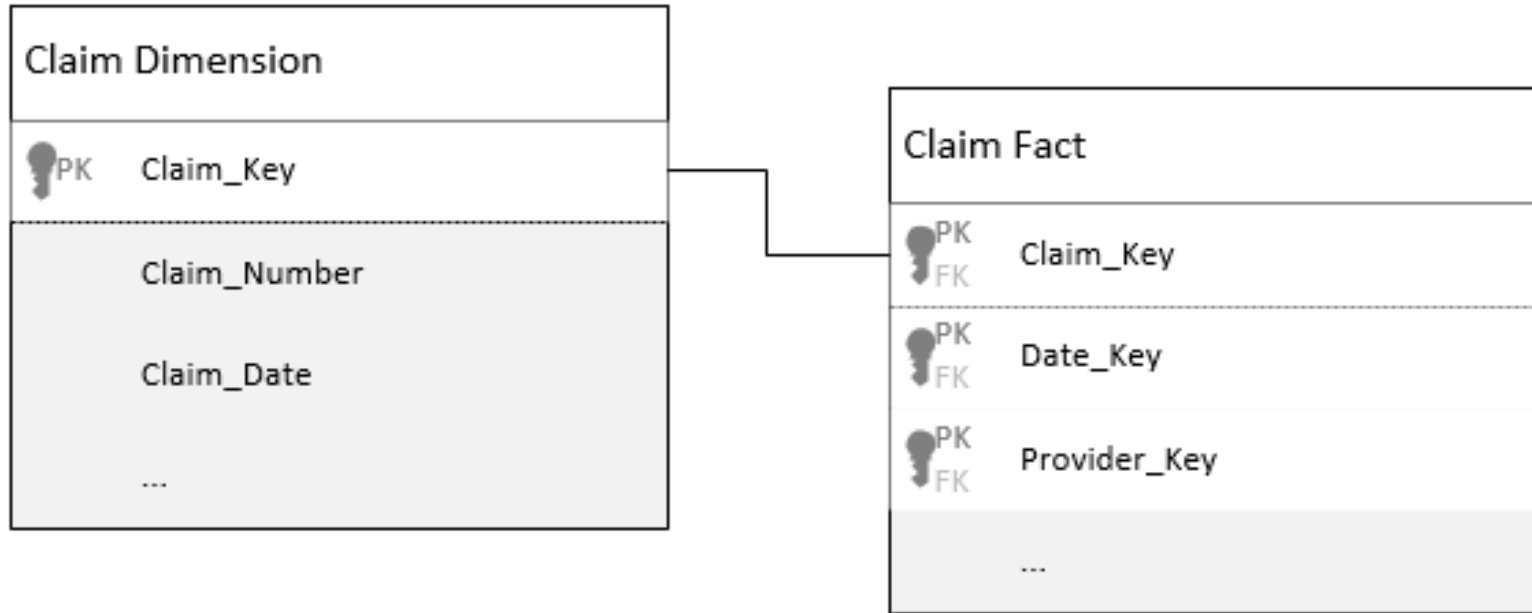
| Employee Dimension | |
|--|--------------|
|  PK | Employee_Key |
| Employee_Code | |
| Organizational_Unit | |
| Practice | |
| ... | |
| Effective_Date | |
| Termination Date | |
| Current_Record | |

| Project Dimension | |
|--|-------------|
|  PK | Project_Key |
| Project_Number | |
| ... | |
| Effective_Date | |
| Termination Date | |
| Current_Record | |

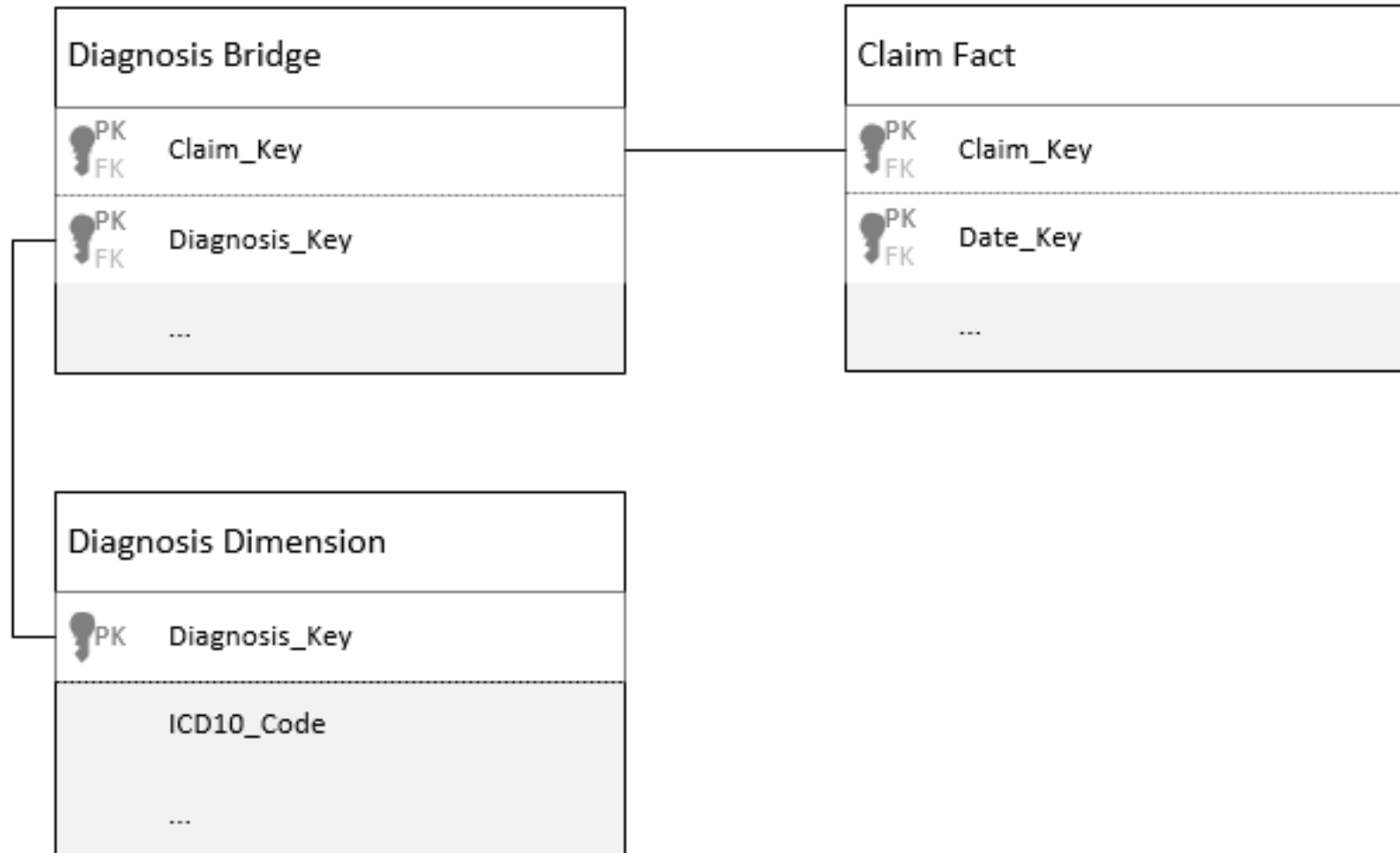
| Project Resource Dimension | |
|--|----------------|
|  PK | Project_Number |
|  PK | Employee_Code |
| ... | |

Fact Relationships

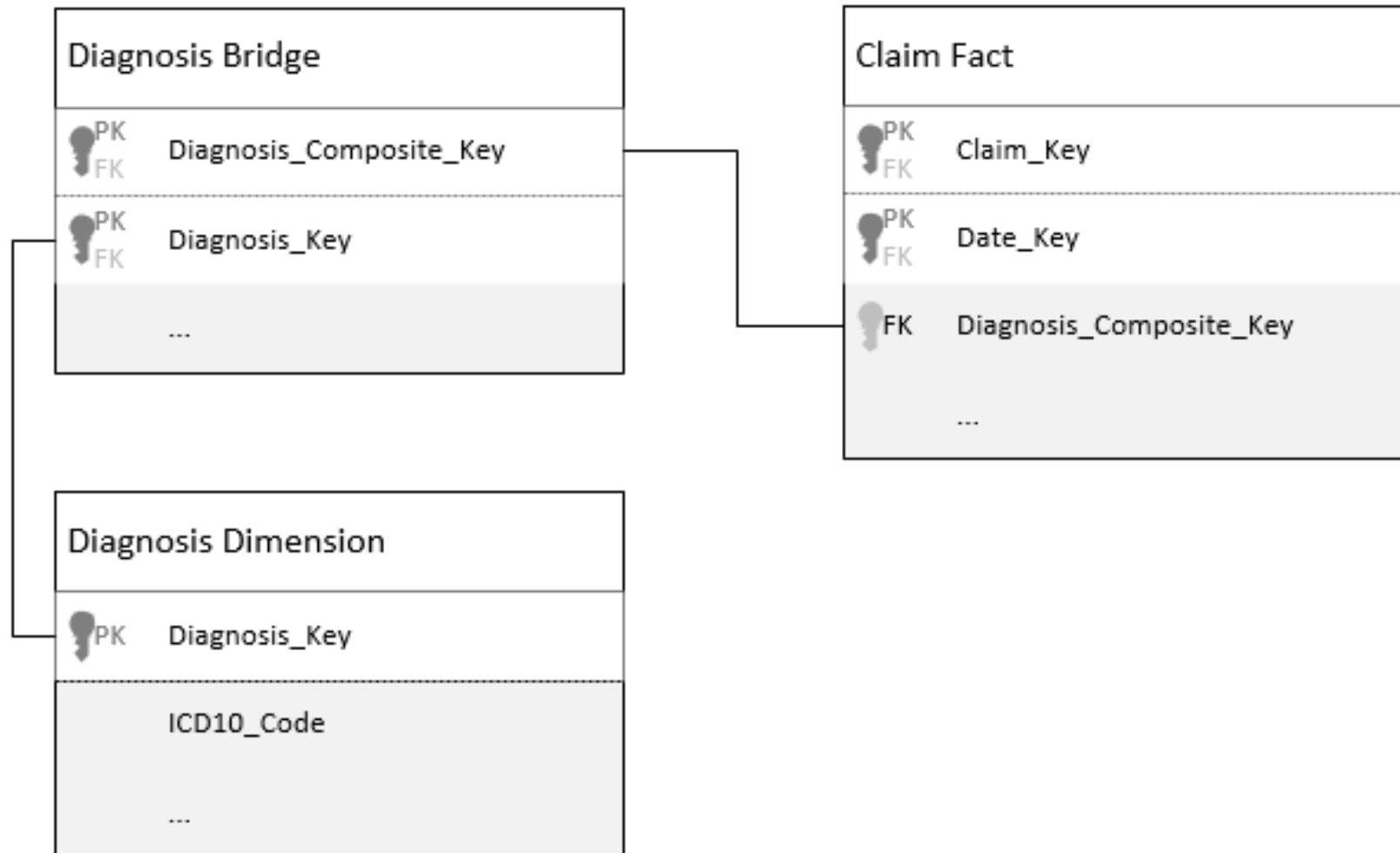
One-To-One (1:1)



Many-To-Many (M:M)



Many-To-Many (M:M) Alternative



Demo Time



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