Connectors - Enablers for access to heterogeneous data sources

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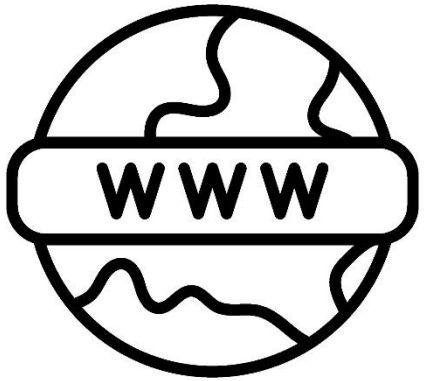
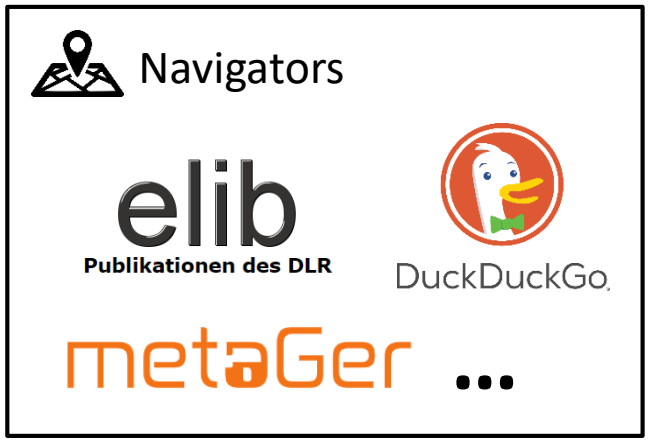
DLR

Introduction - Search and find any data

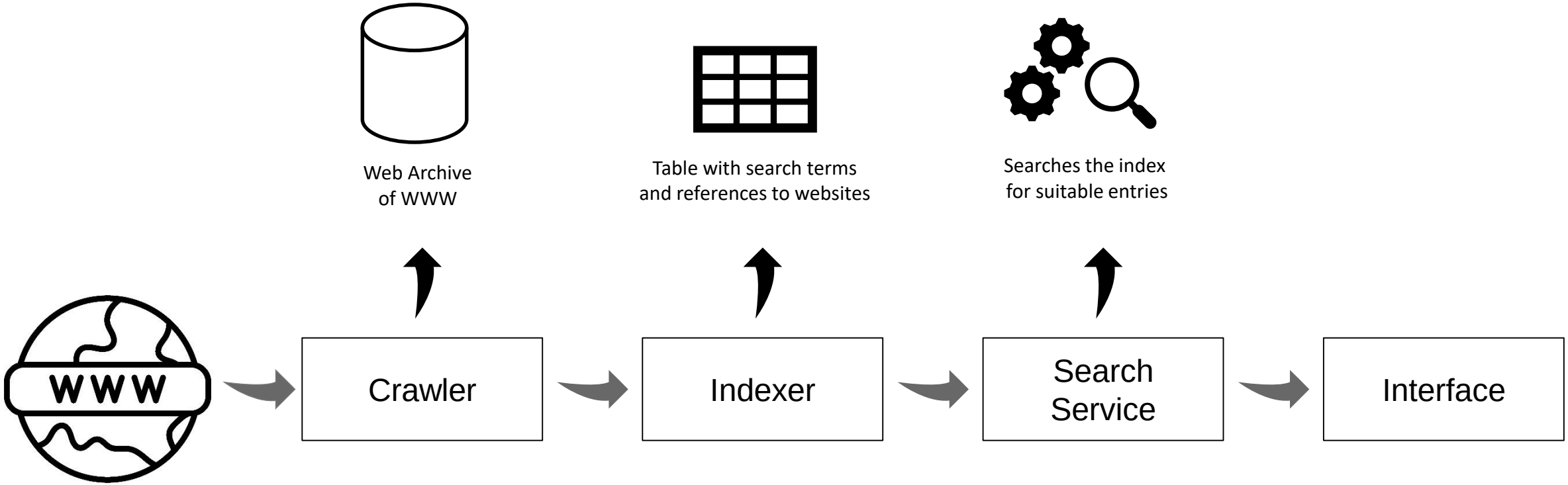




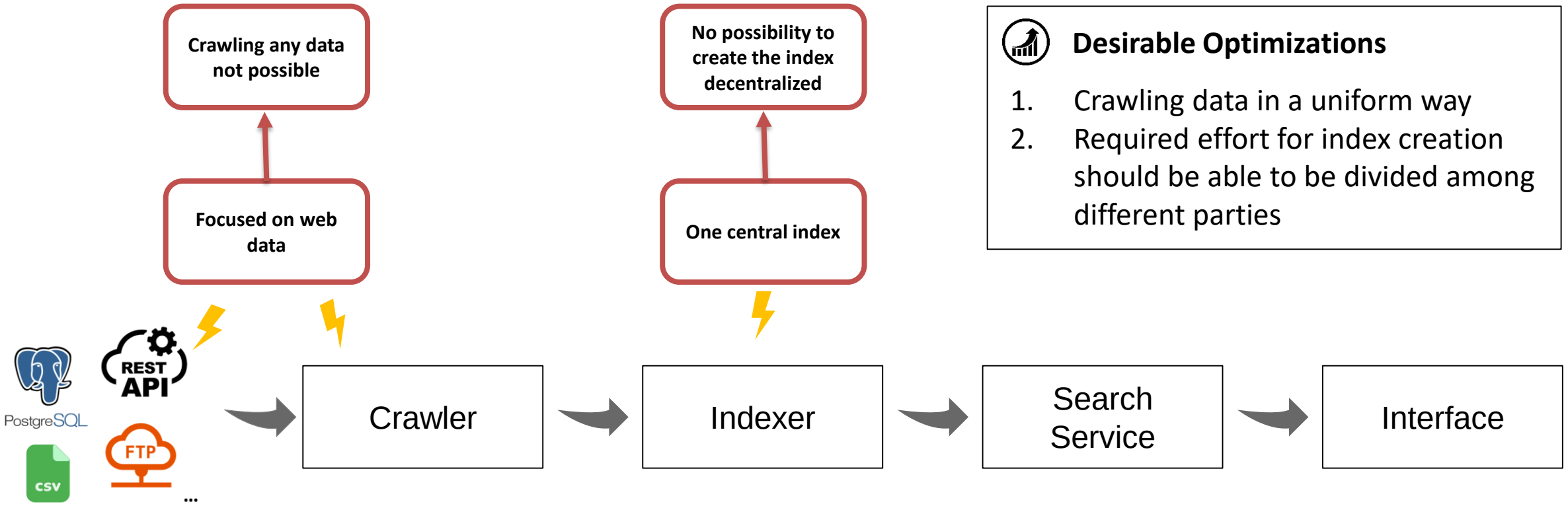
Introduction - Search and find any data

- **Beside web data - other data sources can also provide valuable information**
  - Search should not only focus on classic web data
  - Data can also be found and retrieved in databases, REST APIs, FTP servers , …
- **But - Wide variety of different interfaces and formats**
  - Data is queried in different ways depending on the type of data source
  - More difficult to make the data searchable for users
- **Challenge:** *How can technically heterogeneous data sources be uniformly accessed and searched?*

Challenge - Structure of common Web Search Architectures



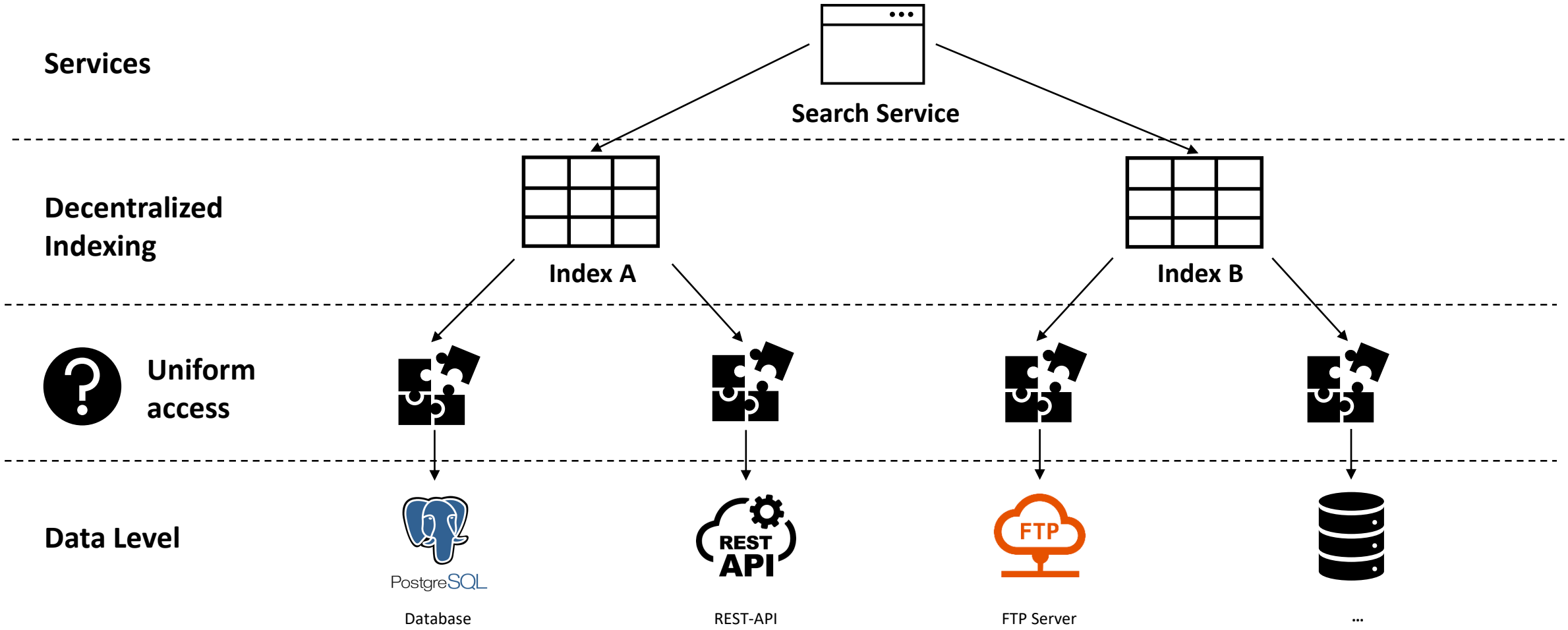
Challenge - Limits of common Web Search Architectures



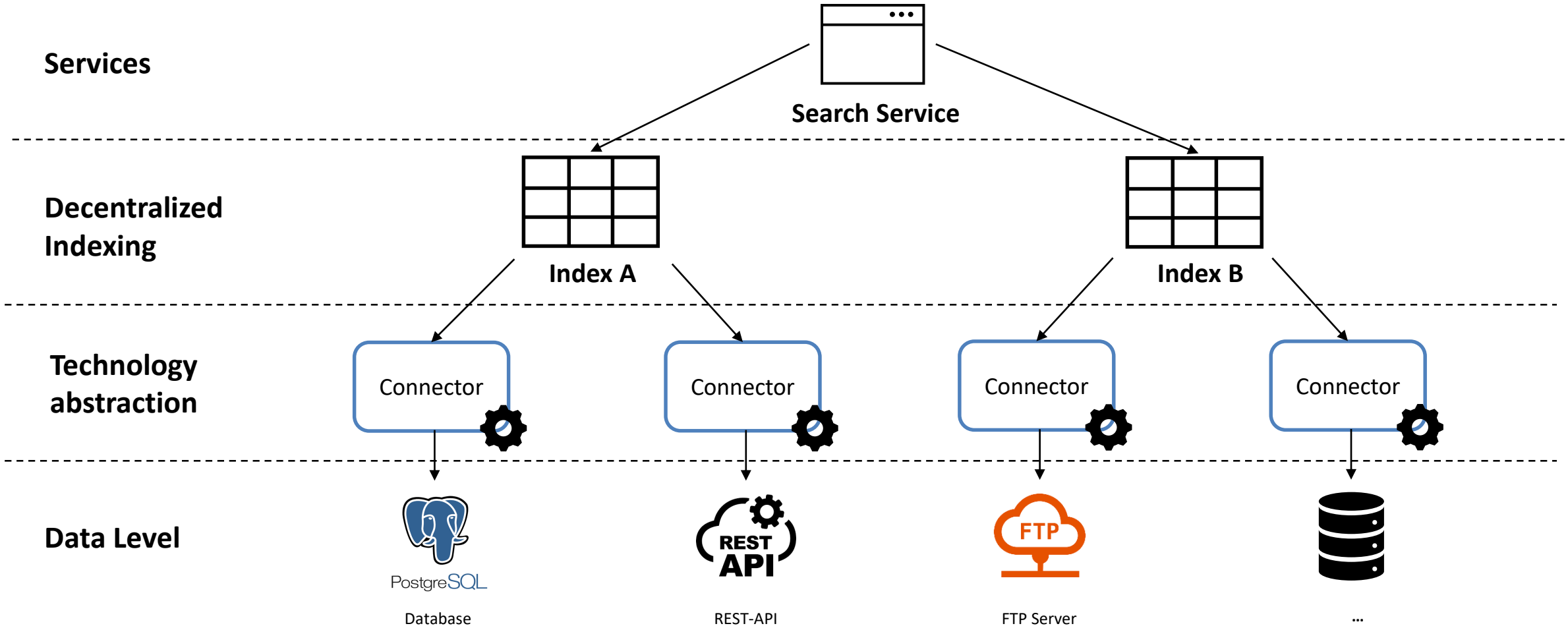
Desirable Optimizations

1. Crawling data in a uniform way
2. Required effort for index creation should be able to be divided among different parties

Challenge - Architecture for Indexing Heterogenous Data Sources

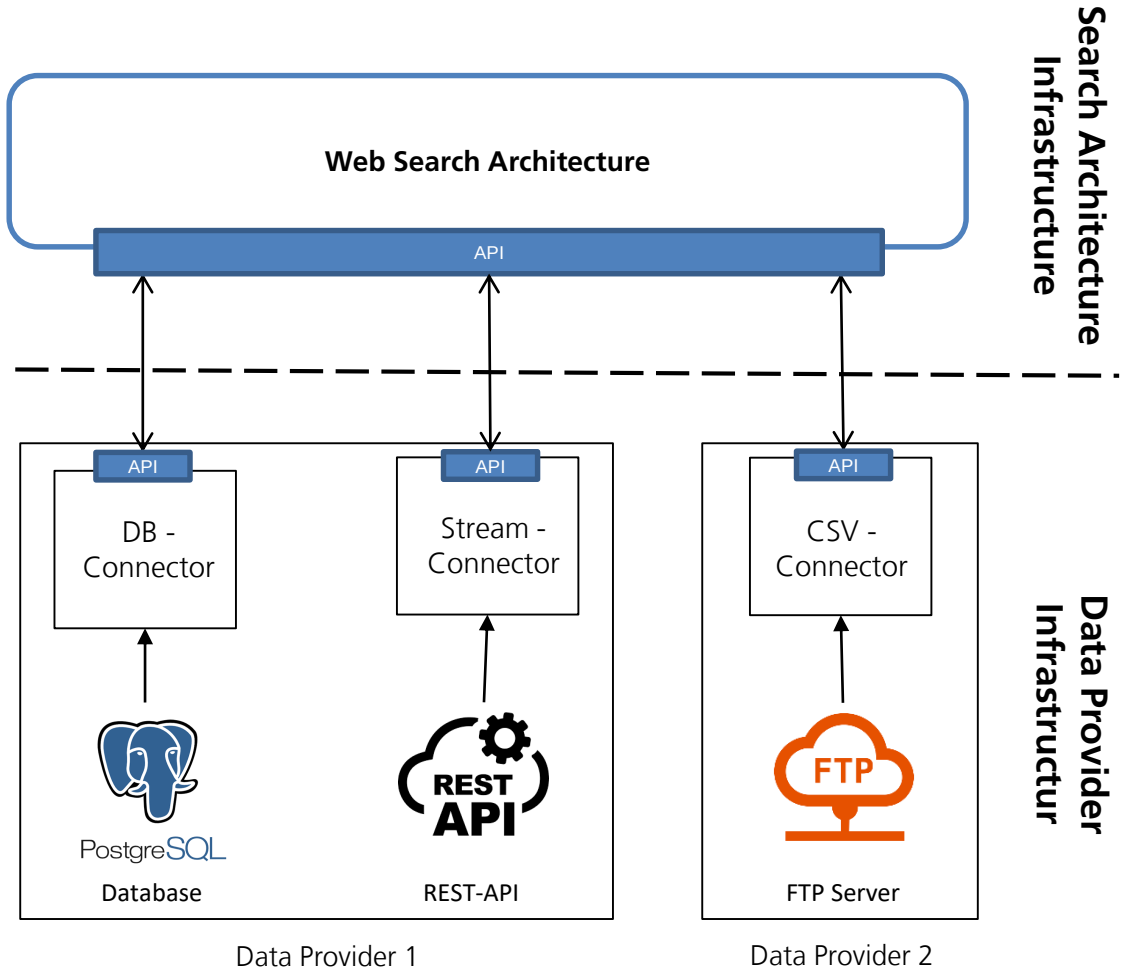


Challenge - Architecture for Indexing Heterogenous Data Sources

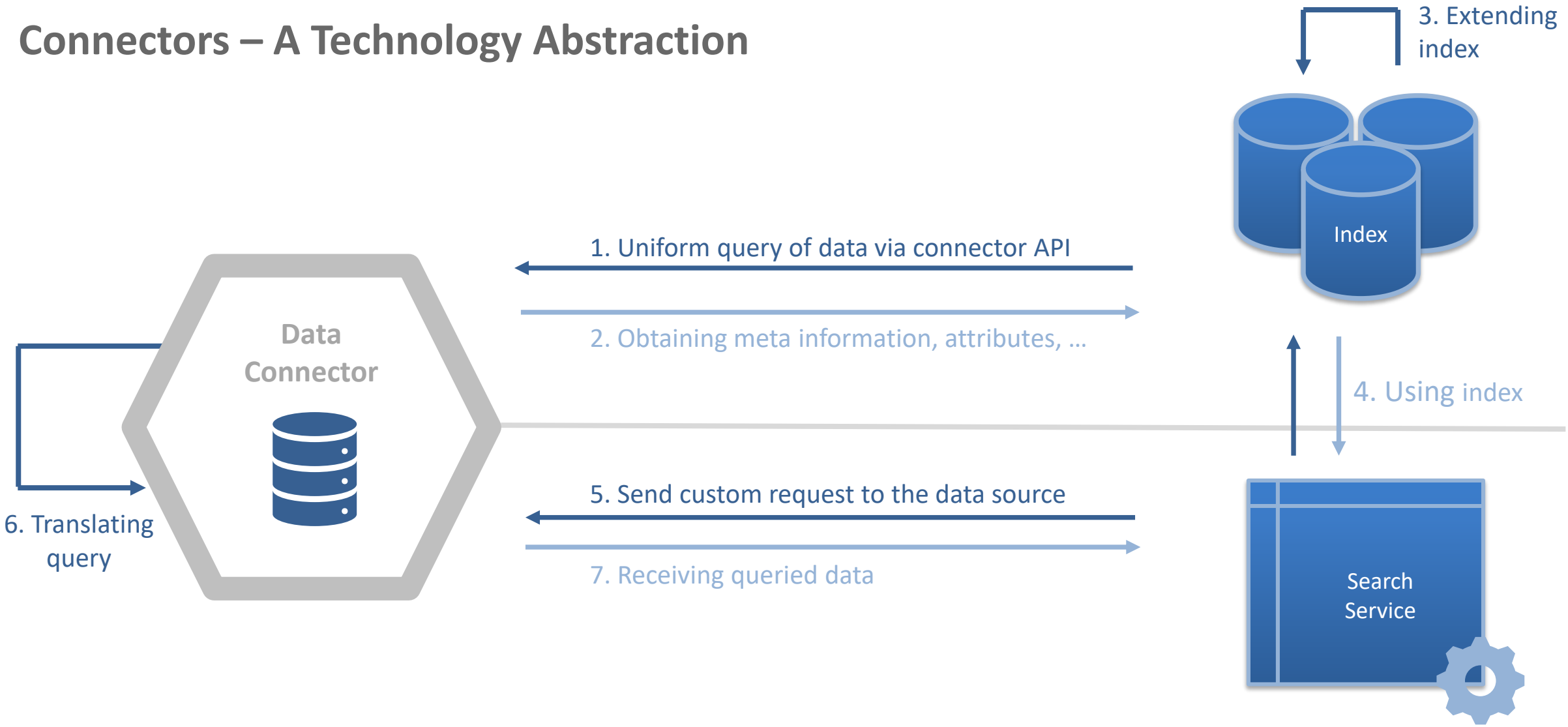


Connectors – A Technology Abstraction

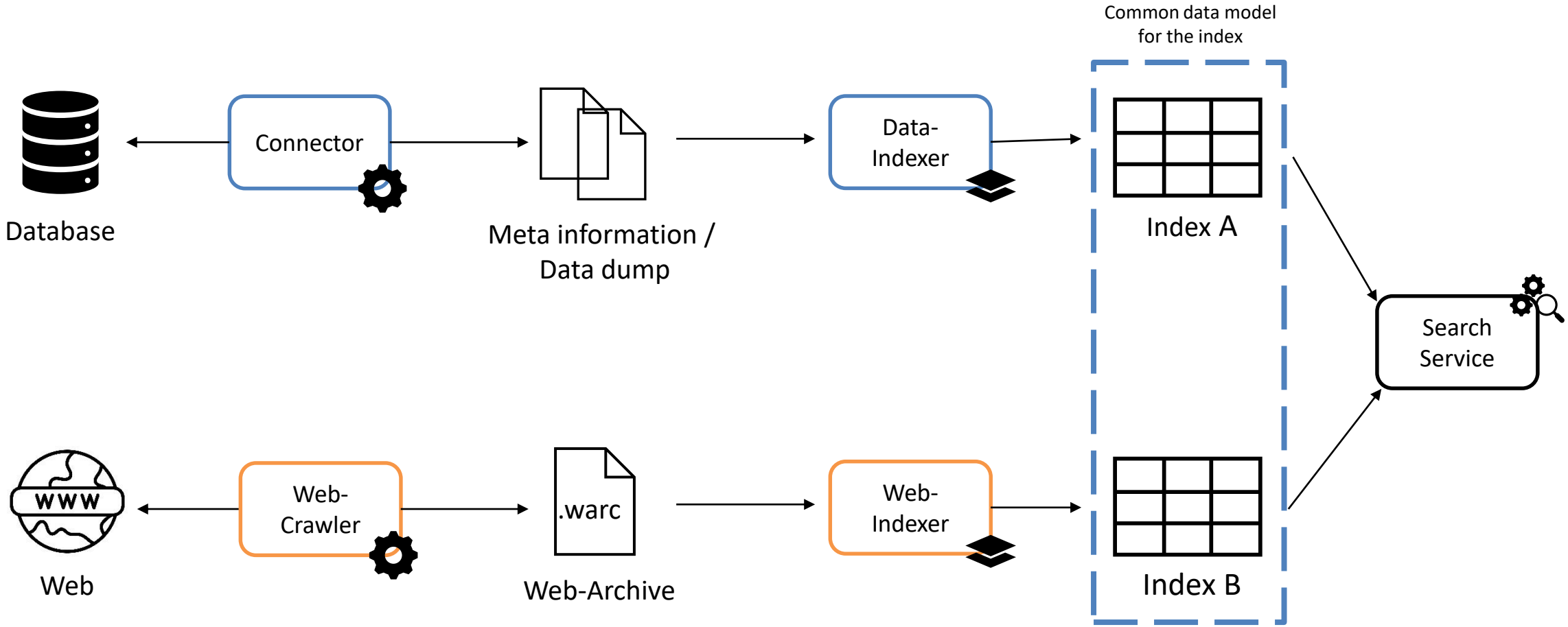
- **Uniform data access to distributed heterogeneous data sources by using "connectors“**
- **Each data source has its own connector**
- **Intermediation between Data Source and Application**
  - Technology abstraction - translates language of data source into one specific common language
  - Follows a standardized interface specification and is thus fully interoperable
- **Connectors are operated by the respective data provider**
  - Protection of data sovereignty
  - Control over provided content
  - Access control by provider
  - Simple connection and disconnection of the data source possible



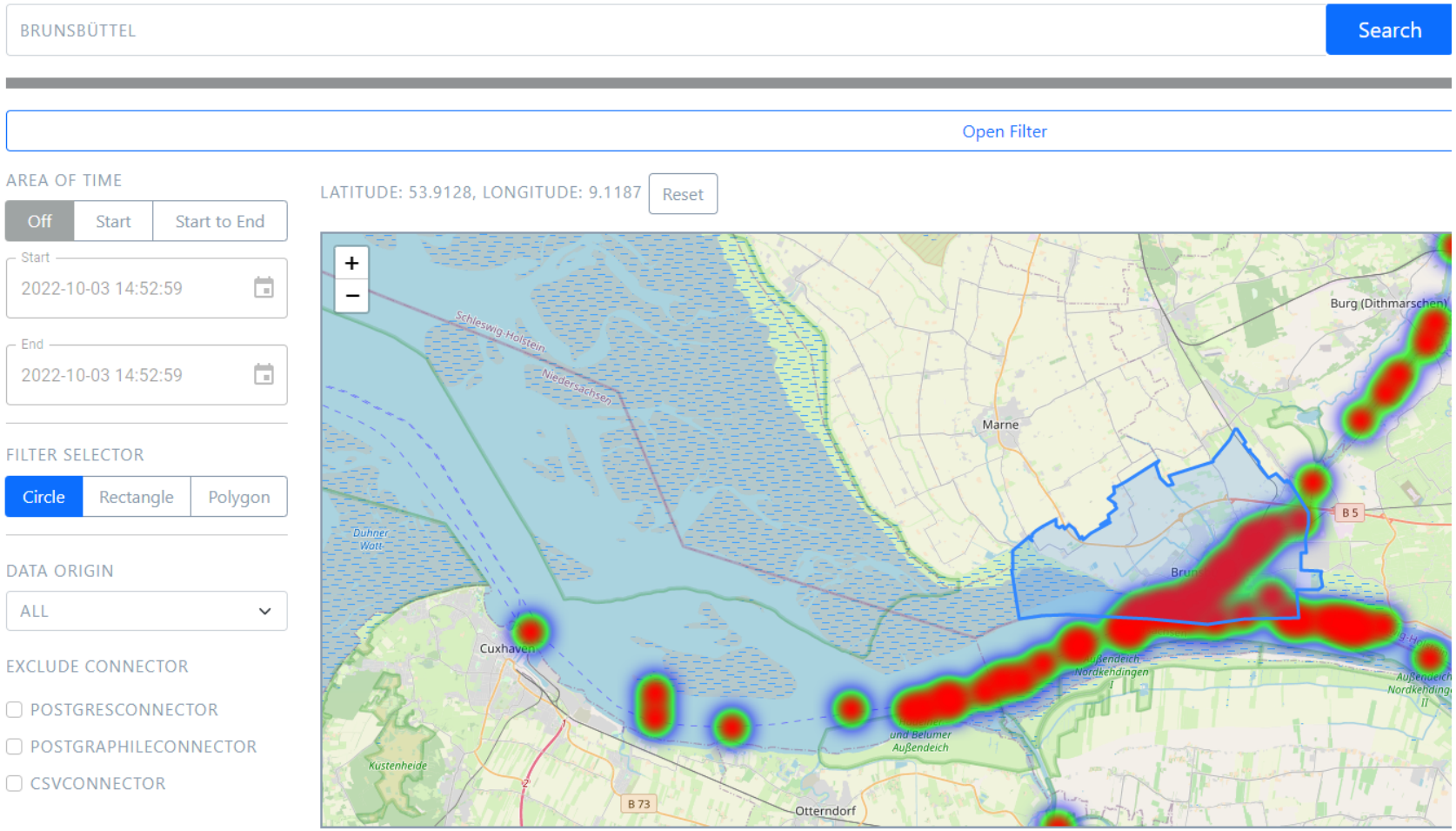
Connectors – A Technology Abstraction



Architecture for Indexing Heterogenous Data Sources



Application Example – OpenSearch@DLR Prototype



- **OpenSearch@DLR prototype**
- 3 Data Sources (Postgres Database, REST-API, CSV-File)
- Connected with 3 implemented connectors
- Heterogeneous data sources can now be searched and queried simultaneously through the UI
  - Keyword search
  - Geographic search
  - Temporal search

Application Example – OpenSearch@DLR Prototype

POSTGRAPHILECONNECTOR

NUMBER OF RESULTS: 497

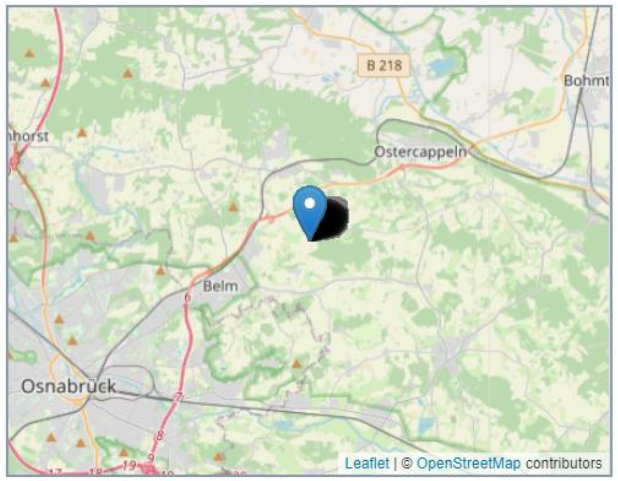
AREA OF TIME: .

START : 2016-05-30T11:06:30.000Z

END : 2020-11-05T08:00:00.000Z

CONNECTORFIELDS


```
"CONNECTORFIELDS" : [
  0 : {
    "NODES" : [
      0 : {
        "GEOMETRY" : [
          0 : "GEOJSON"
          1 : "SRID"
          2 : "X"
          3 : "Y"
```

POSTGRESCONNECTOR

NUMBER OF RESULTS: 2002

AREA OF TIME:

START : 2016-05-30T11:06:30.000Z

END : 2020-11-05T08:00:00.000Z

CONNECTORFIELDS


```
"CONNECTORFIELDS" : [
  0 : {
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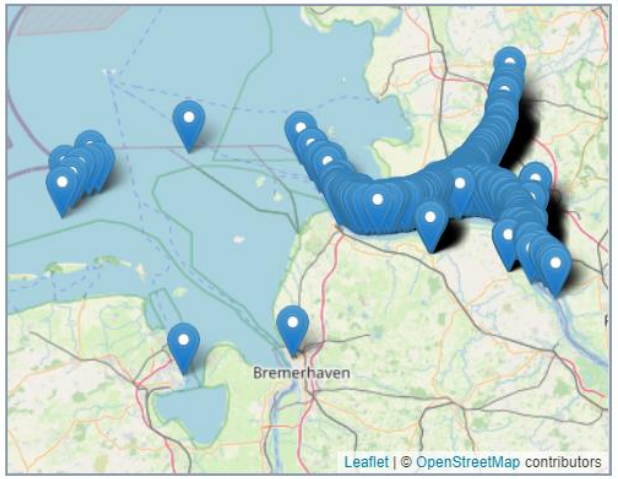

Summary

- Searching heterogenous data sources has **different requirements** than classic web search
  - Needs to handle different technologies and interfaces

- Connector **„speaks“** the language of data source and the common language of the service
  - Serves as a translator
  - Despite heterogeneous technologies **one uniform query language** for all data sources

- **Services** can be realized easier through uniform interface
  - Indexer / Search Service does not need to understand the language of the underlying data source