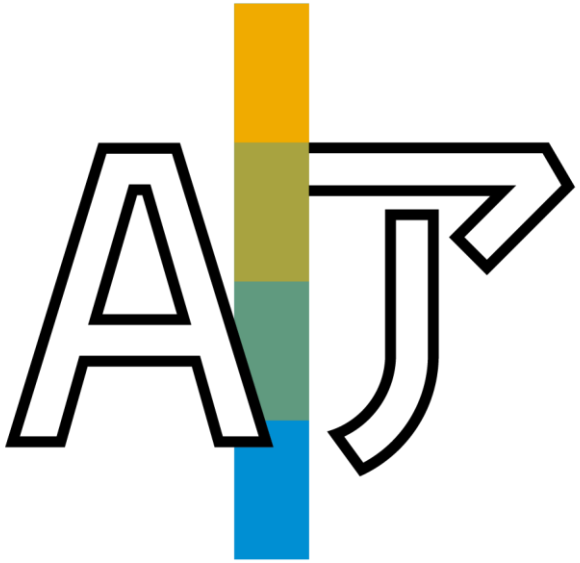
Week 1: Introducing SAP Cloud Application Programming Model

Unit 3: Getting Started with Core Data Services (CDS)

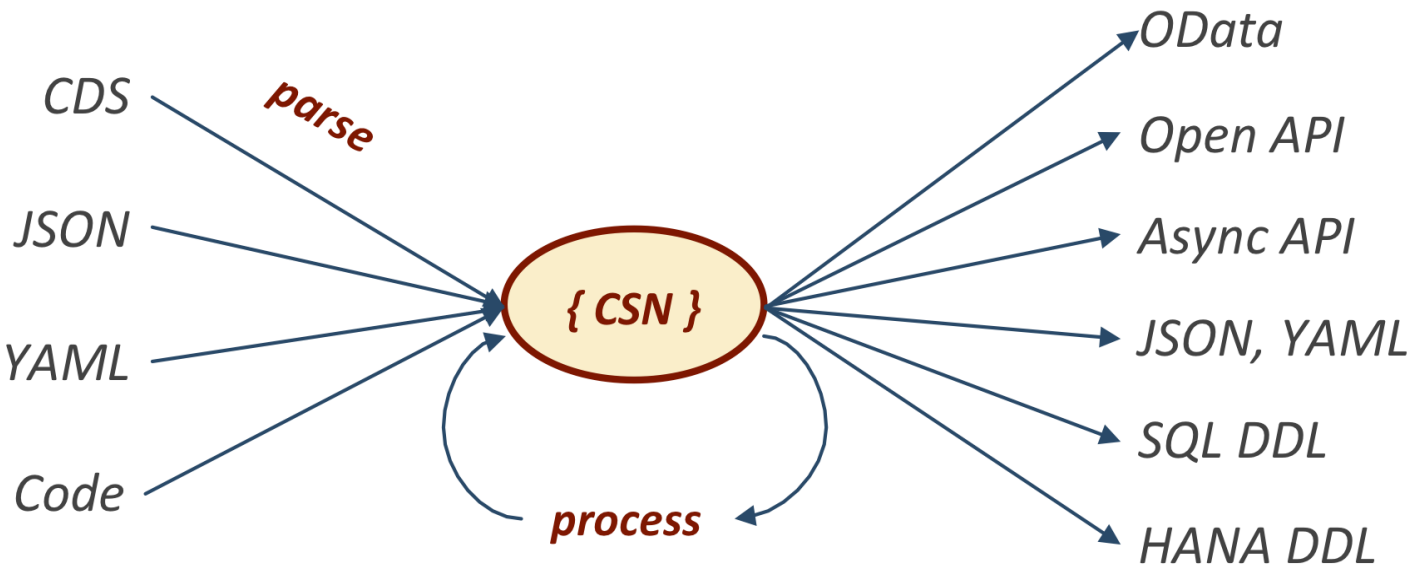
What is CDS?

- CDS stands for Core Data Services
- It is a set of domain-specific languages
- The backbone of the SAP Cloud Application Programming Model



What is CDS?

- Declaratively capture data models, service definitions, queries, and expressions
- JavaScript objects complying with the Core Schema Notation (CSN)
- Models can be easily created and interpreted, which fosters extensions by 3rd party contributions



Definition Language (CDL)

- Entities
- Views
- Associations
- Aspects
- Types
- Service definitions
- … and more

```
entity Books: managed @(title:'Bücher') {
  key ID : UUID;
  title  : localized String;
  author : Association to Authors;
}

entity Authors {
  key ID : UUID;
  name   : String;
  books  : Composition of many Books;
}
```

Definition Language (CDL)

- Entities
- Views
- Associations
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- Types
- Service definitions
- … and more

```
entity Books as projection on db.Books;

entity Authors as projection on db.Authors;

entity Orders as SELECT * from db.Orders;
```

Definition Language (CDL)

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entity Books: managed @(title:'Bücher') {
  key ID : UUID;
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  key ID : UUID;
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  books  : Composition of many Books;
}
```

Definition Language (CDL)

- Entities
- Views
- Associations
- Aspects
- Types
- Service definitions
- … and more

```
aspect managed {
  modifiedAt : DateTime @cds.on.update : $now;
  createdAt  : DateTime @cds.on.insert : $now;
  createdBy  : User     @cds.on.insert : $user;
  modifiedBy : User     @cds.on.update : $user;
}

entity Books: managed @(title:'Bücher') {
  key ID : UUID;
  title  : localized String;
  author : Association to Authors;
}
```

Definition Language (CDL)

- Entities
- Views
- Associations
- Aspects
- Types
- Service definitions
- … and more

```
type User : String(111);

type Amount {
  value : Decimal(10,3);
  currency : Currency;
}

type Currency : Association to Currencies;

entity Order {
  buyer : User;
  price : Amount;
}
```

Definition Language (CDL)

- Entities
- Views
- Associations
- Aspects
- Types
- Service definitions
- … and more

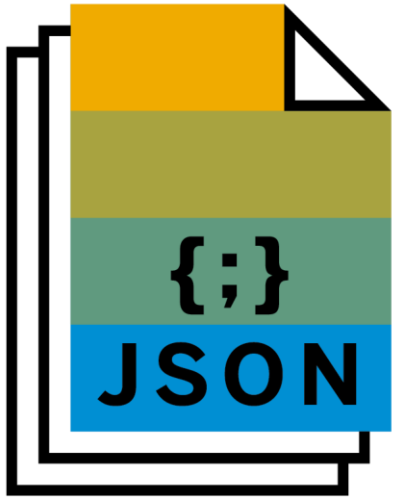
```
service CatalogService {
  entity Books as projection on db.Books;
  entity Authors as projection on db.Authors;

  entity Orders as projection on db.Orders {
    *,
    book.title,
    book.author.name as author
  } where createdBy = $user;

  action cancel(order:UUID);
}
```

Core Schema Notation (CSN)

- A compact JSON representations of data and service models
- Similar to JSON Schema but goes beyond with the ability to capture full-blown entity-relationship models
- Perfect source to generate target models, such as OData/EDM interfaces, as well as persistence models for SQL or NoSQL databases.



Core Schema Notation (CSN)

CDL entity into CSN example:

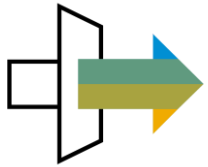
```
entity Books {

  key ID : UUID;

  title  : String;

  author : Association to Authors;

}
```



```
"Books": {
 "kind": "entity",
 "elements": {
  "ID":{ "key": true, "type": "cds.UUI" },
  "title": { "type": "cds.String" },
  "author": {
   "type": "cds.Association",
   "target": "Authors",
   "keys": [ { "ref": [ "id" ] }]
  }
 }
}
```

Core Schema Notation (CSN)

CDL service with an action into CSN example:

```
service Orders {

 action cancelOrder(orderID: Integer)

  returns {

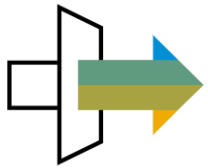
   ack: Boolean

         enum { succeeded; failed; };

   msg: String;

 };

}
```

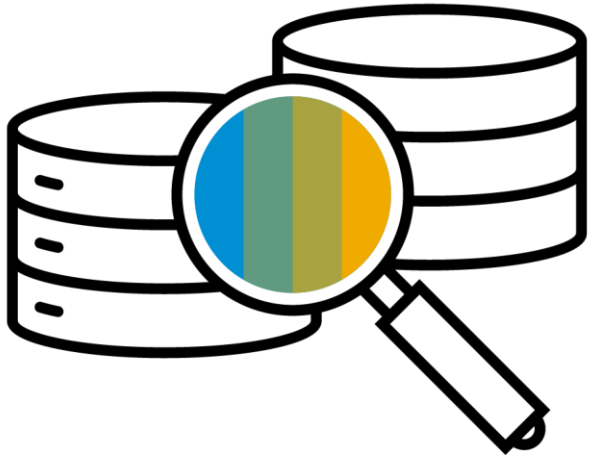


```
"Orders": {
      "kind": "service"
},
"Orders.cancelOrder": {
 "kind": "action",
 "params": {
  "orderID": { "type": "cds.Integer" }
 },
 "returns": {
  "elements": {
   "ack": {
    "type": "cds.Boolean",
    "enum": { "succeeded": {},
              "failed": {}
            }
    },
   "msg": { "type": "cds.String" }
  }
 }
}
```

Query Language (CQL)

CDS QL is based on standard SQL with some enhancements:

- Postfix projections
- Path expressions
- CDL-style casts
- Excluding clause
- Query-local mixins



Query Language (CQL)

- Postfix projections
- Path expressions
- CDL-style casts
- Excluding clause
- Query-local mixins

```
SELECT from Books { *, author.name as author};
```

Query Language (CQL)

- Postfix projections
- Path expressions
- CDL-style casts
- Excluding clause
- Query-local mixins

```
SELECT from Authors[name='Emily Brontë'].books;

SELECT from Books:authors.towns;

SELECT title, author.name from Books;

SELECT from Books where author.name='Emily
Brontë';
```

Query Language (CQL)

- Postfix projections
- Path expressions
- CDL-style casts
- Excluding clause
- Query-local mixins

```
SELECT from Books { stock+1 as bar : Decimal };
```

Query Language (CQL)

- Postfix projections
- Path expressions
- CDL-style casts
- Excluding clause
- Query-local mixins

```
SELECT from Books { * } excluding { author };
```

Query Language (CQL)

- Postfix projections
- Path expressions
- CDL-style casts
- Excluding clause
- Query-local mixins

```
SELECT from Books mixin {

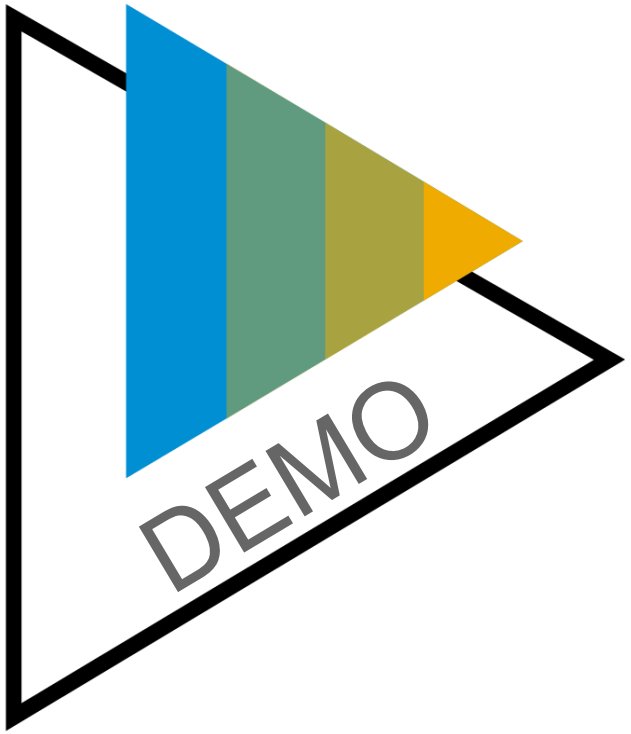
 localized : Association to LocalizedBooks on
localized.ID = ID;

} into {

 ID, localized.title

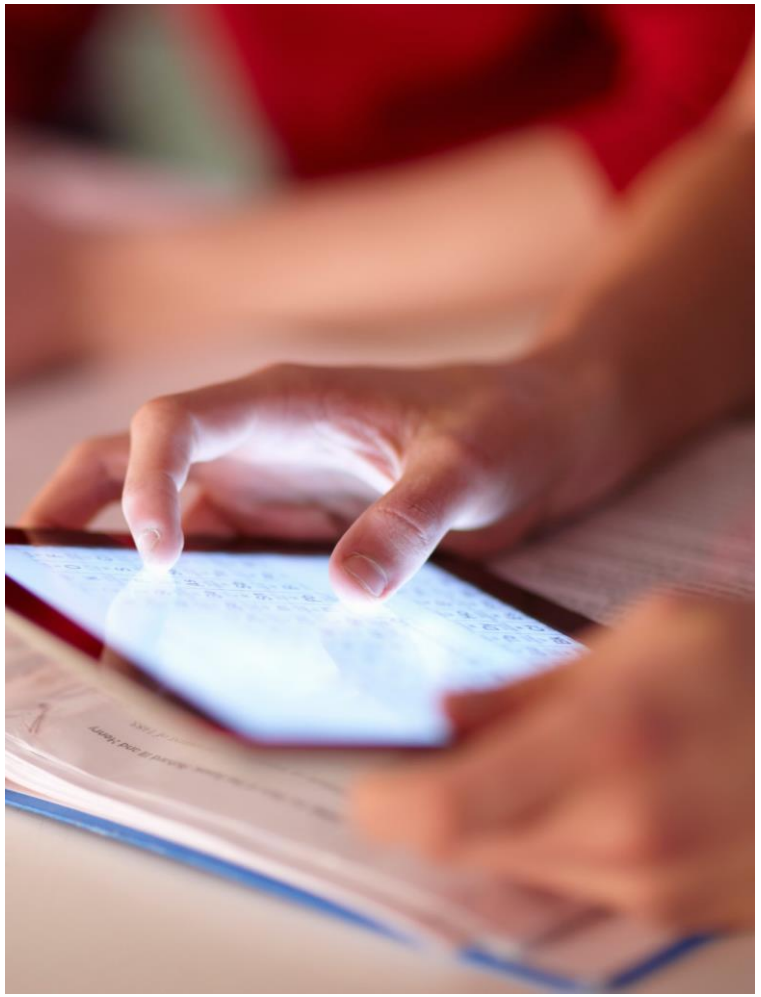
};
```

Demo



What you've learned in this unit

- What CDS is
- Definition Language (CDL)
- Core Schema Notation (CSN)
- Query Language (CQL)



Further reading

Additional Material

- Official documentation
- Definition Language (CDL)
- Core Schema Notation (CSN)
- Query Language (CQL)
- Domain-specific languages guide

Thank you.

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