

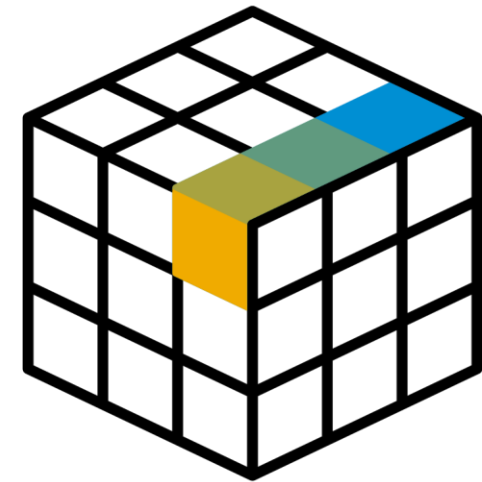


Week 1: Introducing SAP Cloud Application Programming Model

Unit 1: Introduction to SAP Cloud Application Programming Model

Motivation

- Customers need a stable environment for business application development
- Reduce high entry barrier for less tech-savvy developers
- Customers ask for guidance and best practices
- Developers want to focus on business logic



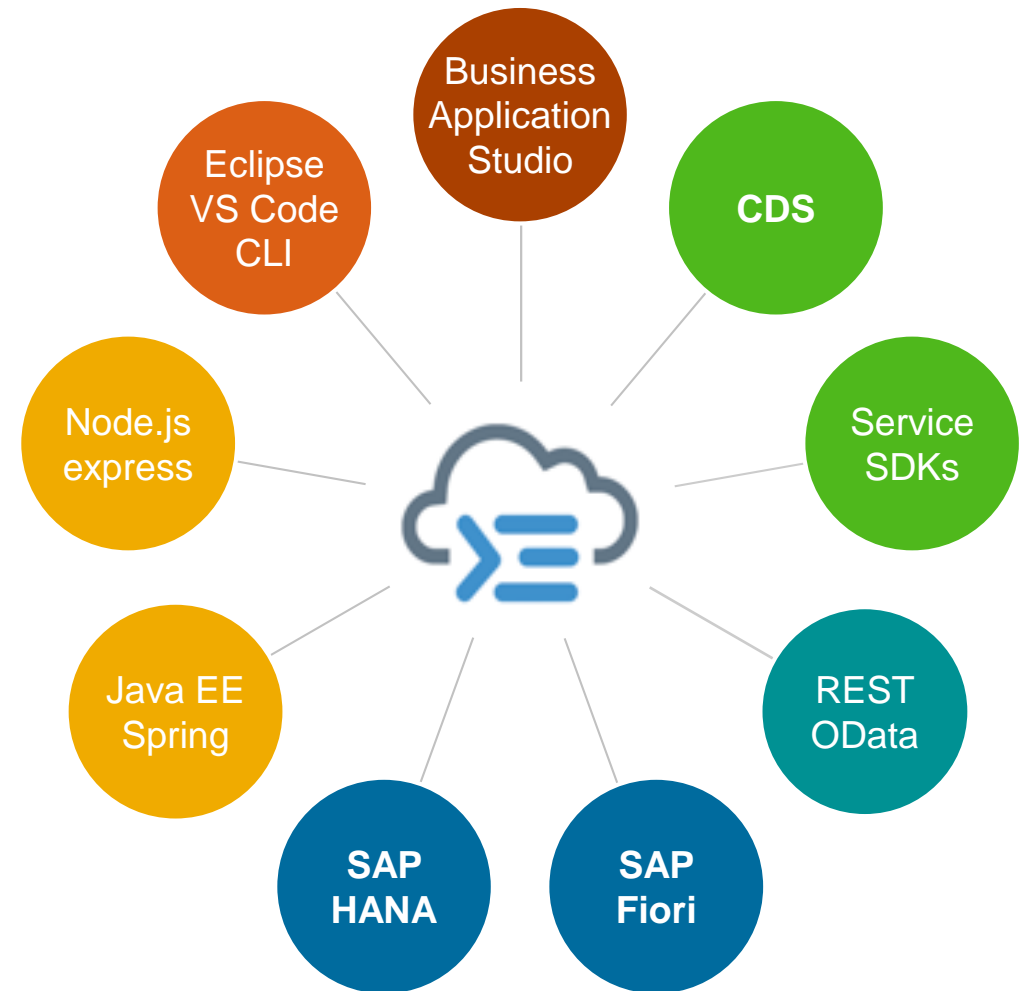
Introduction to SAP Cloud Application Programming Model

Introduction

*The SAP Cloud Application Programming Model is an **opinionated**, yet **open** framework of tools, languages, and libraries to efficiently build enterprise-grade services and applications.*

*It guides developers along a 'golden path' of proven **best practices**, while minimizing boilerplate so they can **focus on their domain** problems at hand.*

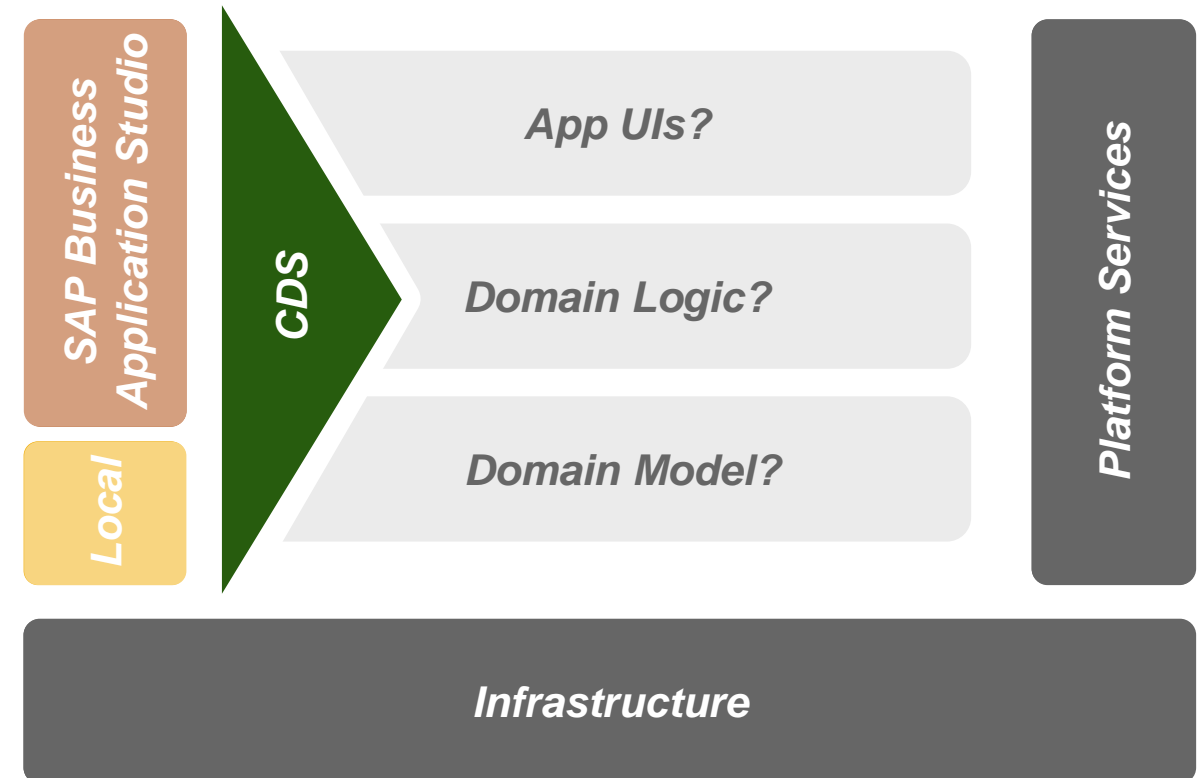
*The framework features a mix of broadly adopted **open-source** and **SAP** tools and technologies.*



Introduction to SAP Cloud Application Programming Model

Ingredients

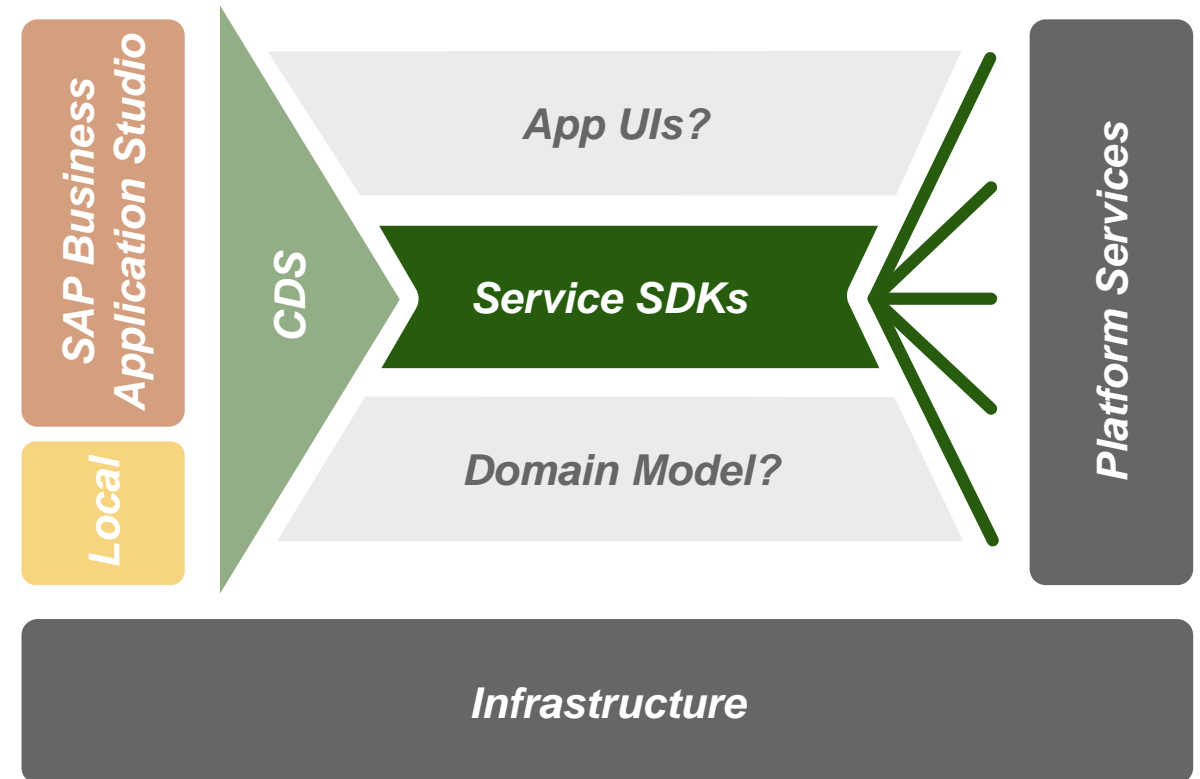
- **Core Data Services (CDS)** is a data modeling infrastructure
- You can use CDS to define data models and service definitions



Introduction to SAP Cloud Application Programming Model

Ingredients

- Choose between **Java** and **Node.js**
- Provide and consume services
- Easy access to libraries provided by SAP
- High-level integration to low-level platform services (abstraction)

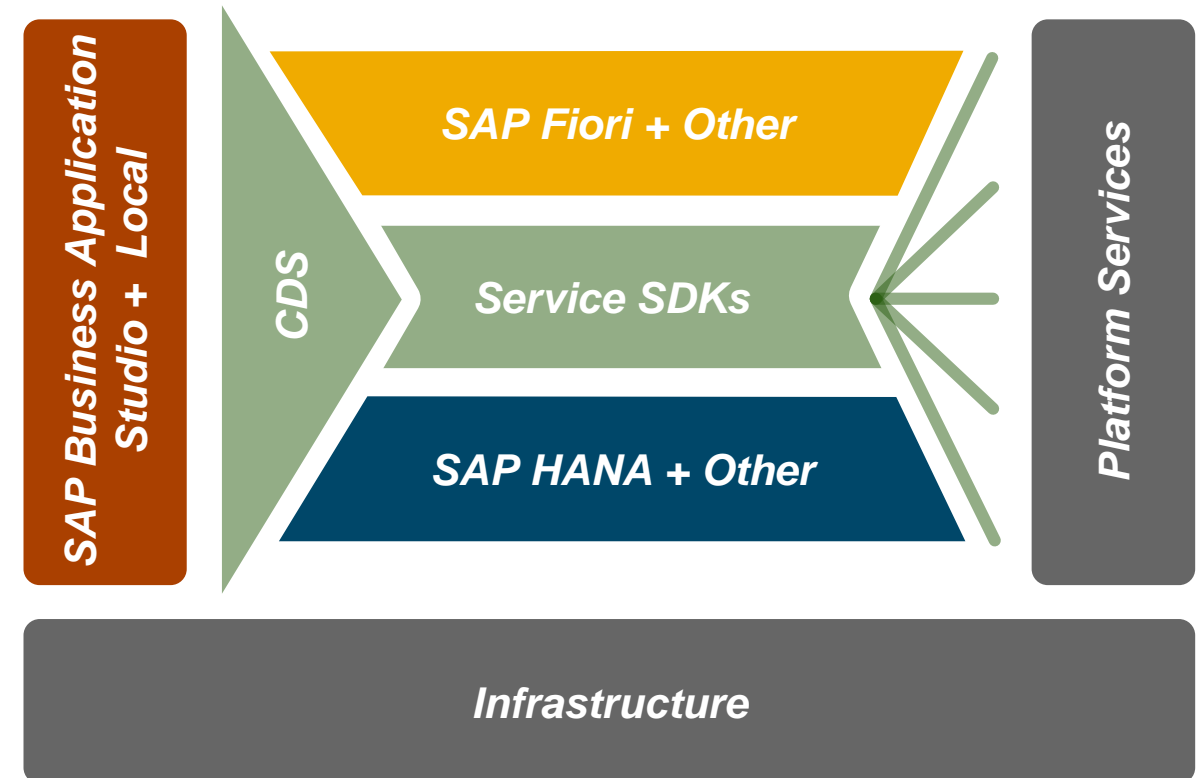


Introduction to SAP Cloud Application Programming Model

Ingredients

Get *1st-class support* for...

- **SAP Business Application Studio**
with tailored tools
- **SAP Fiori Elements**
- **SAP HANA**



Introduction to SAP Cloud Application Programming Model

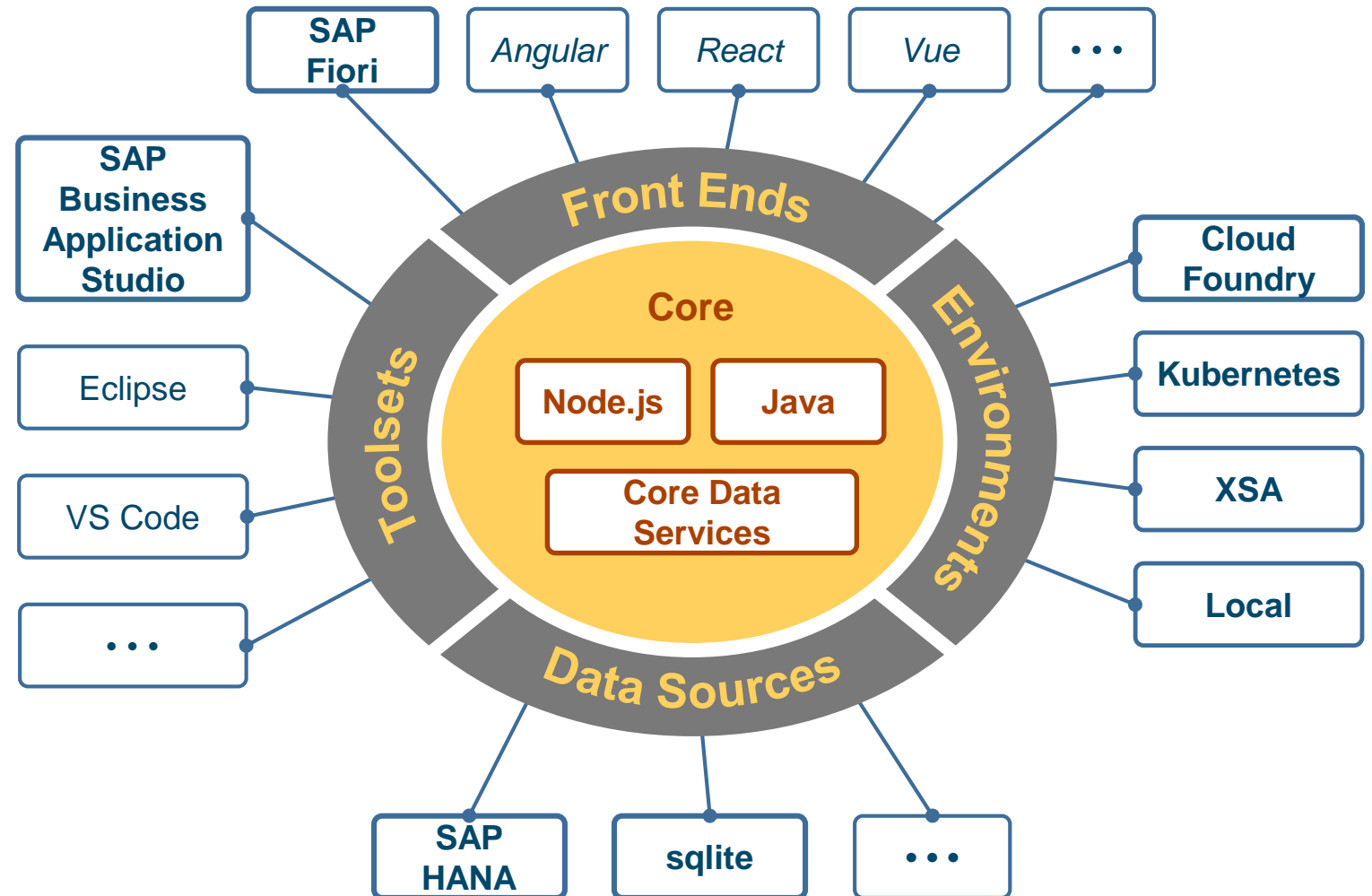
Design principles

Open

- You choose technologies
- Select your architecture pattern
- Use CAP or parts of CAP

Opinionated

- Gives guidance
- Support for recurring tasks

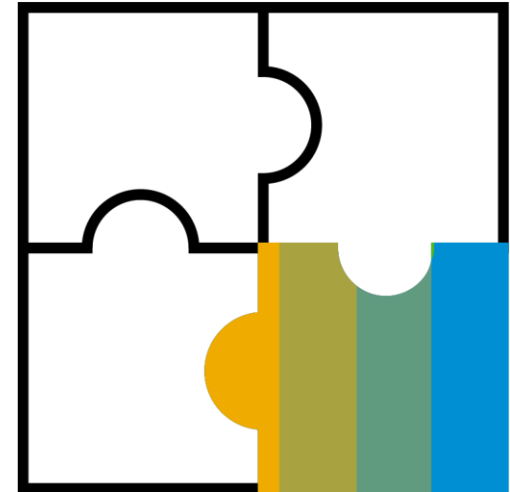


Introduction to SAP Cloud Application Programming Model

Design principles

Zero Lock-In

- You choose UI and database technology
- SAP Fiori Elements and SAP HANA out-of-the-box
- Designed to integrate with alternatives



Introduction to SAP Cloud Application Programming Model

Design principles

Non-Intrusive

- Your architecture, your methodology
- CAP is free of assumptions
- Avoids boilerplate using convention over configuration

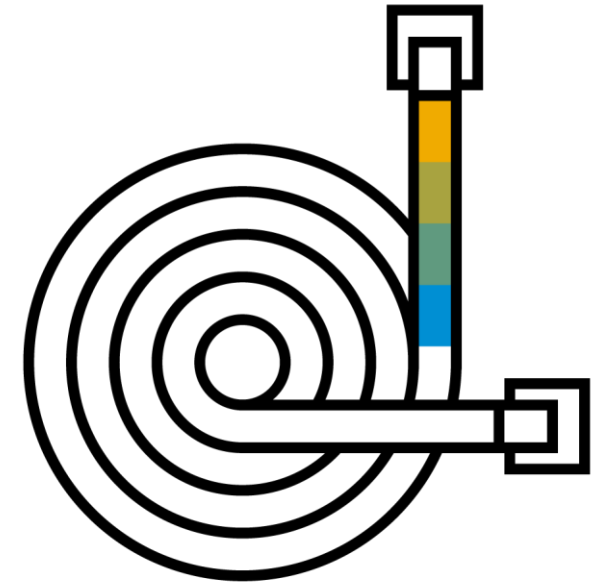


Introduction to SAP Cloud Application Programming Model

Design principles

Platform-Agnostic

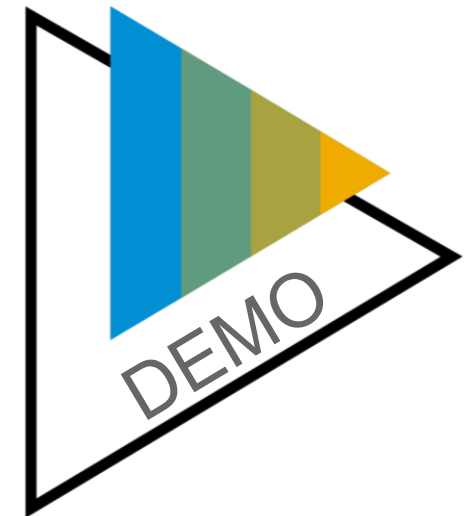
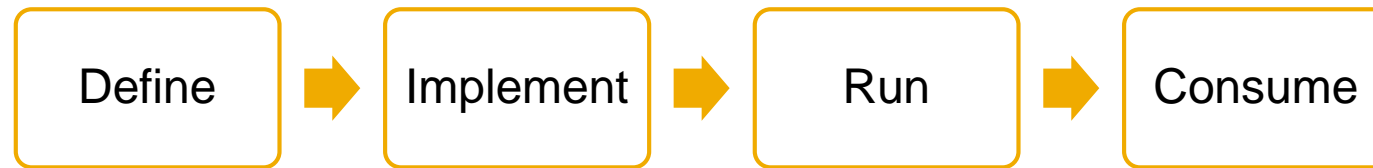
- Use higher-level APIs
- Avoids hard-wiring
- Enables you to keep pace with cloud technologies



Introduction to SAP Cloud Application Programming Model

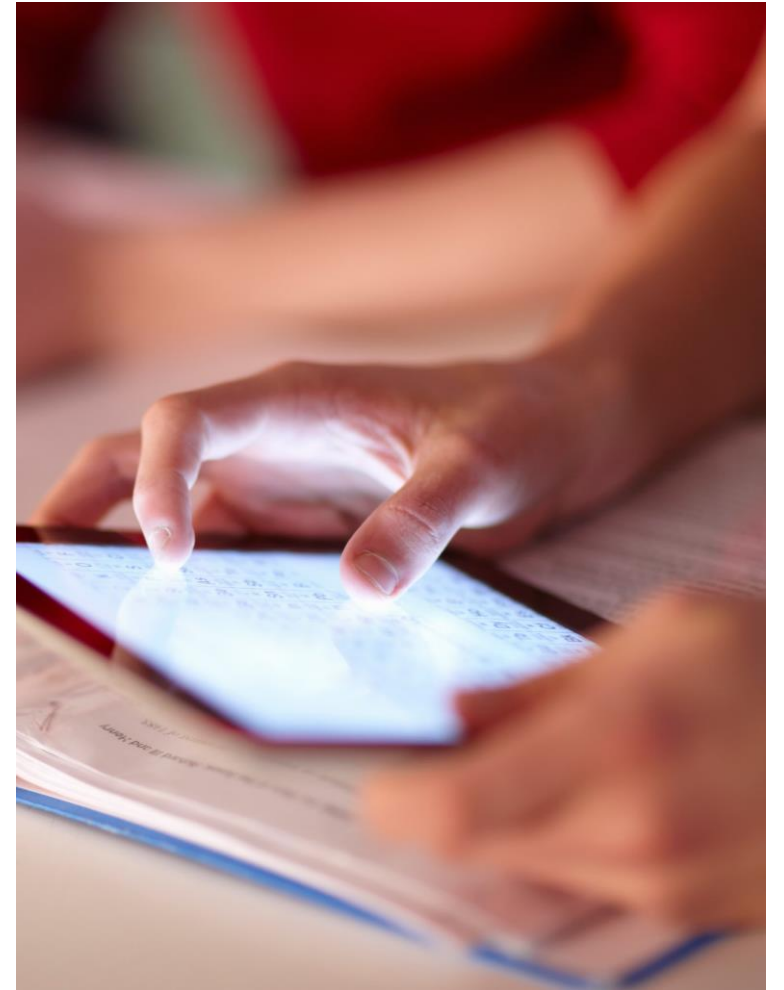
Demo

Create a “**Hello World**” application



What you've learned in this unit

- How you can focus on your business domain by using SAP Cloud Application Programming Model
- What benefits you have while developing with SAP Cloud Application Programming Model
- Which toolset and capabilities SAP Cloud Application Programming Model offers for development



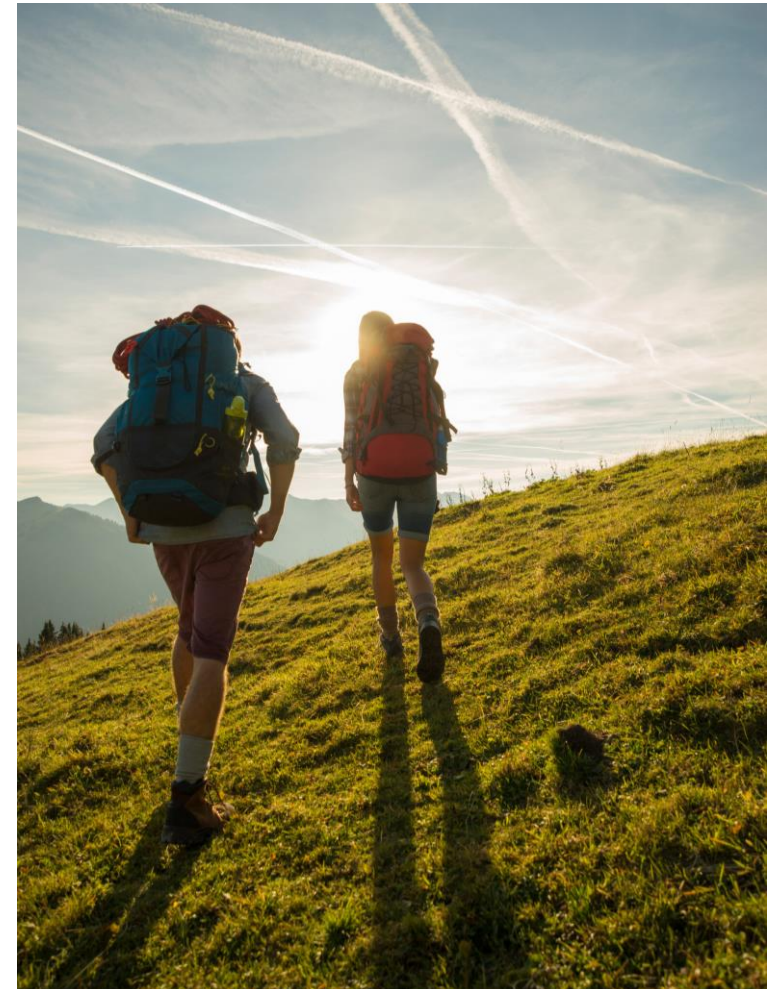
Introduction to SAP Cloud Application Programming Model

Further reading



Additional Material

- [Official documentation](#)
- [Blogs Cloud Application Programming Model](#)
- [Starter Scenario](#)
- [TechEd Replay](#)
- [Hello World Tutorial](#)



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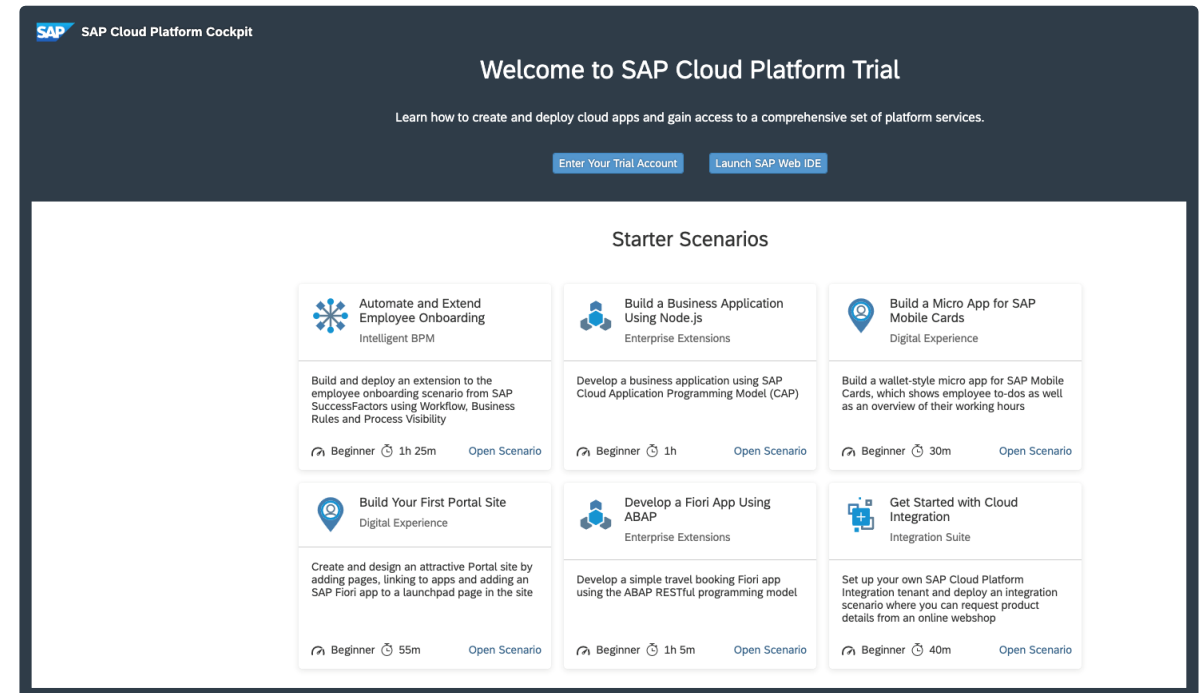
Week 1: Introducing SAP Cloud Application Programming Model

Unit 2: Tools and Setup for Core Data Services (CDS)

Tools and Setup for Core Data Services (CDS)

Getting an SAP Cloud Platform trial account

- SAP Cloud Platform account to try out features
- Free of charge
- Expires after 30 days, but can be extended to a limit of 90 days
- Use production and beta services
- **NO** service-level agreement with regard to the availability of the platform



Using local development tools

Set up npm registry



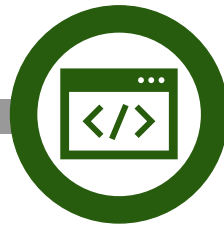
Install CDS



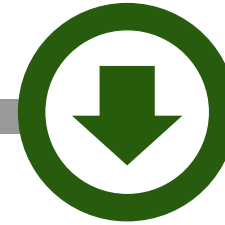
Learn CDS commands



Install extension
in VS Code



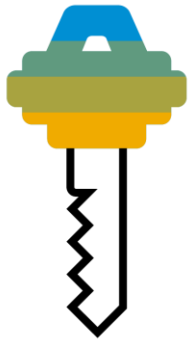
Download CDS
extension



Tools and Setup for Core Data Services (CDS)

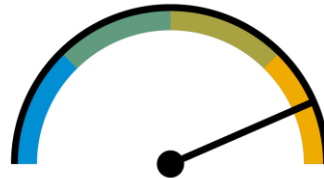
SAP Business Application Studio

A **modular** driven environment, **tailored** for efficient development of business applications for the **Intelligent Enterprise**



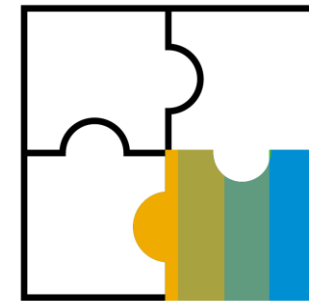
Turn-key solutions

Pre-configured development environments tailored for SAP specific scenarios



Ultimate Productivity

End-to-end development platform, with a desktop-like experience in the cloud

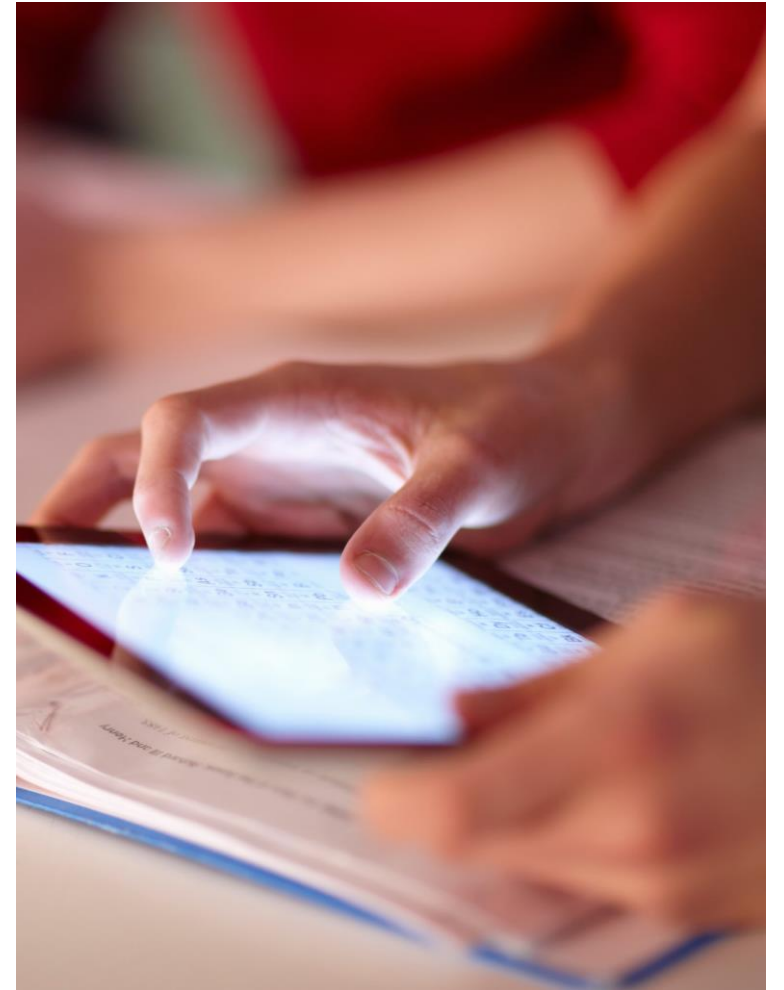


Integrate SAP solutions

Integrating SAP services and SAP solutions via built-in connectivity

What you've learned in this unit

- How to create an SAP Cloud Platform trial account
- The limitations of SAP Cloud Platform trial accounts
- How to set up your local development environment
- How to develop applications with SAP Business Application Studio

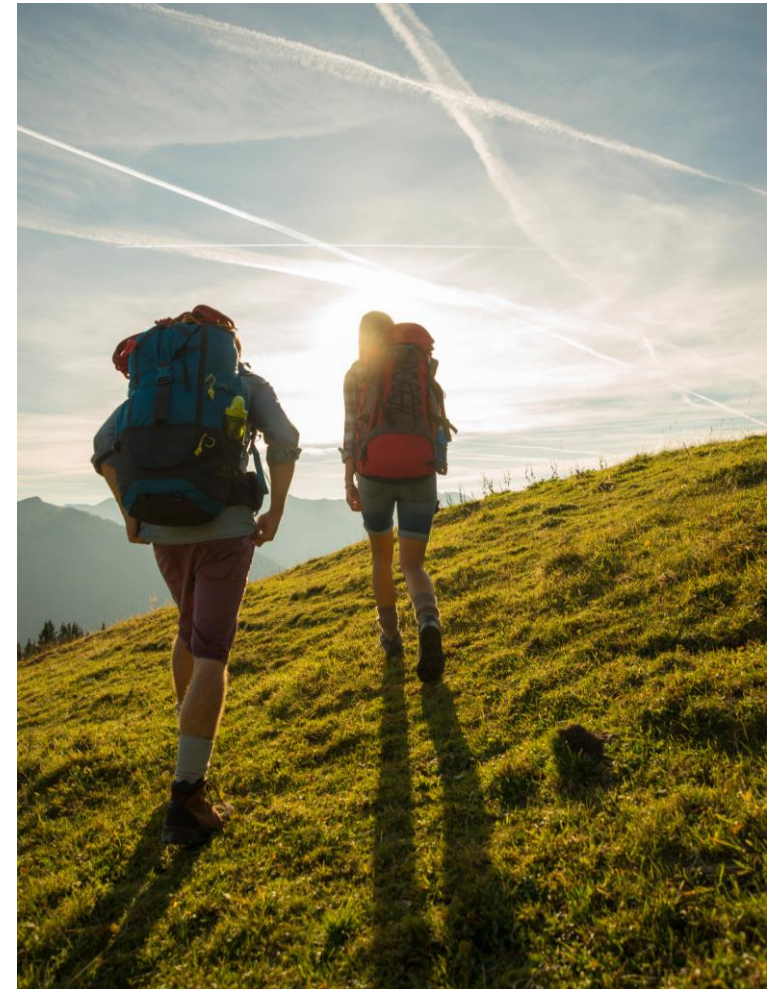


Further reading



Additional Material

- [Documentation: Trial Accounts in the Cloud Foundry Environment](#)
- [Website: Getting a trial account](#)
- [Tutorial: Setup local development tools](#)
- [Blog: SAP Business Application Studio](#)
- [Documentation: SAP Business Application Studio](#)



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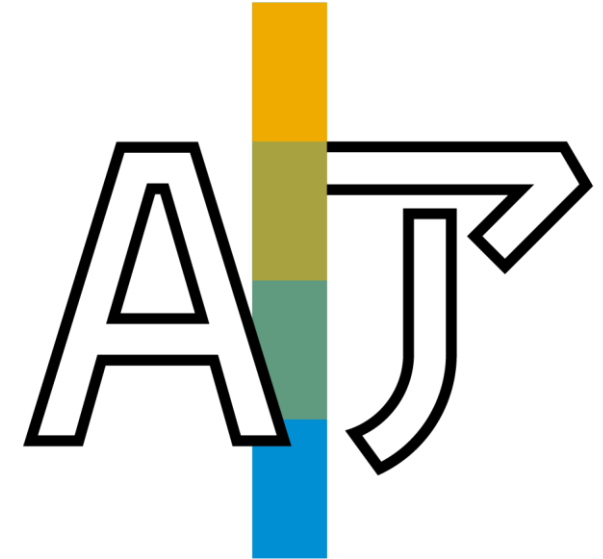


Week 1: Introducing SAP Cloud Application Programming Model

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

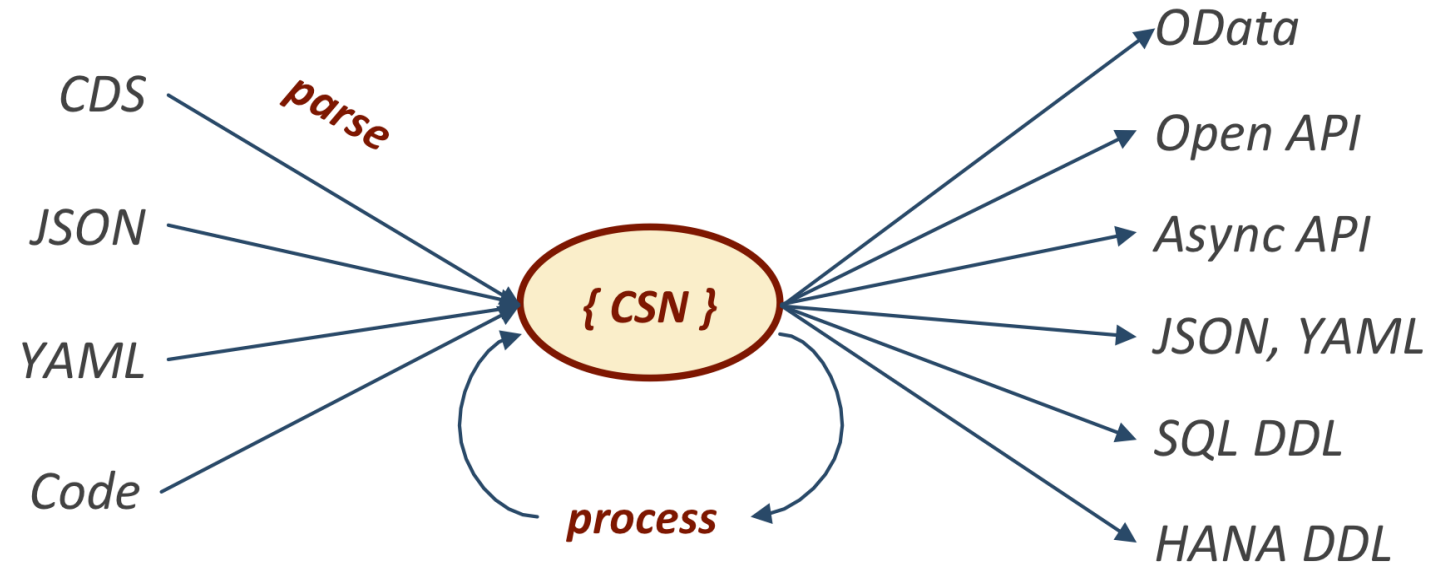
What is CDS?

- 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



Getting Started with Core Data Services (CDS)

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;  
}
```

Getting Started with Core Data Services (CDS)

Definition Language (CDL)

- Entities
- Views
- Associations
- Aspects
- 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;
```

Getting Started with Core Data Services (CDS)

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;  
}
```

Getting Started with Core Data Services (CDS)

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;  
}
```

Getting Started with Core Data Services (CDS)

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;
}
```

Getting Started with Core Data Services (CDS)

Definition Language (CDL)

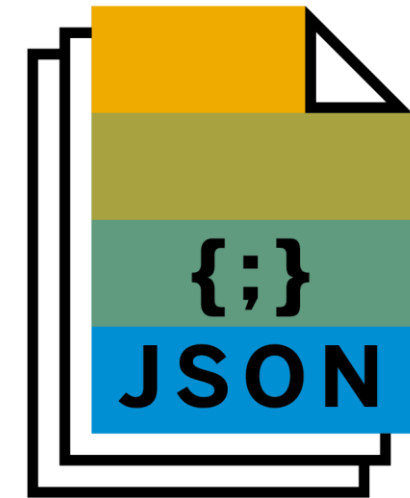
- Entities
- Views
- Associations
- Aspects
- Types
- Service definitions
- ... and more

```
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);  
}
```


Getting Started with Core Data Services (CDS)

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.

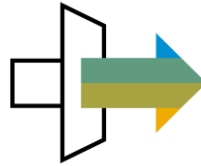


Getting Started with Core Data Services (CDS)

Core Schema Notation (CSN)

CDL entity into CSN example:

```
entity Books {  
    key ID : UUID;  
    title  : String;  
    author : Association to Authors;  
}
```



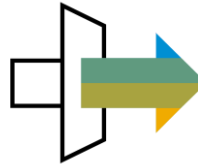
```
"Books": {  
  "kind": "entity",  
  "elements": {  
    "ID": { "key": true, "type": "cds.UUID" },  
    "title": { "type": "cds.String" },  
    "author": {  
      "type": "cds.Association",  
      "target": "Authors",  
      "keys": [ { "ref": [ "id" ] } ]  
    }  
  }  
}
```

Getting Started with Core Data Services (CDS)

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;  
  
  };  
}
```



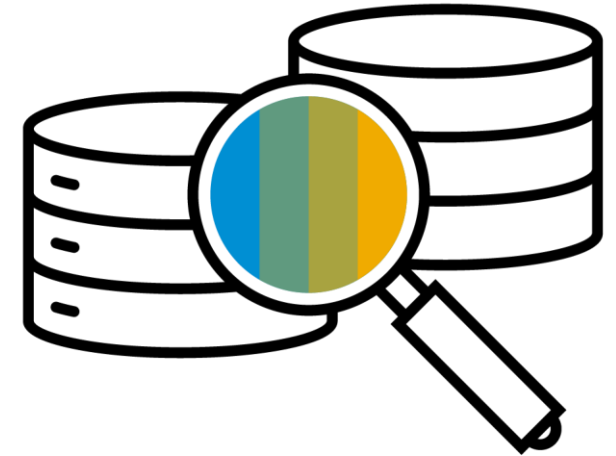
```
"Orders": {  
  "kind": "service"  
},  
"Orders.cancelOrder": {  
  "kind": "action",  
  "params": {  
    "orderID": { "type": "cds.Integer" }  
  },  
  "returns": {  
    "elements": {  
      "ack": {  
        "type": "cds.Boolean",  
        "enum": { "succeeded": {},  
                 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

Getting Started with Core Data Services (CDS)

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



Getting Started with Core Data Services (CDS)

Query Language (CQL)

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

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

Getting Started with Core Data Services (CDS)

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';
```

Getting Started with Core Data Services (CDS)

Query Language (CQL)

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

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

Getting Started with Core Data Services (CDS)

Query Language (CQL)

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

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


Getting Started with Core Data Services (CDS)

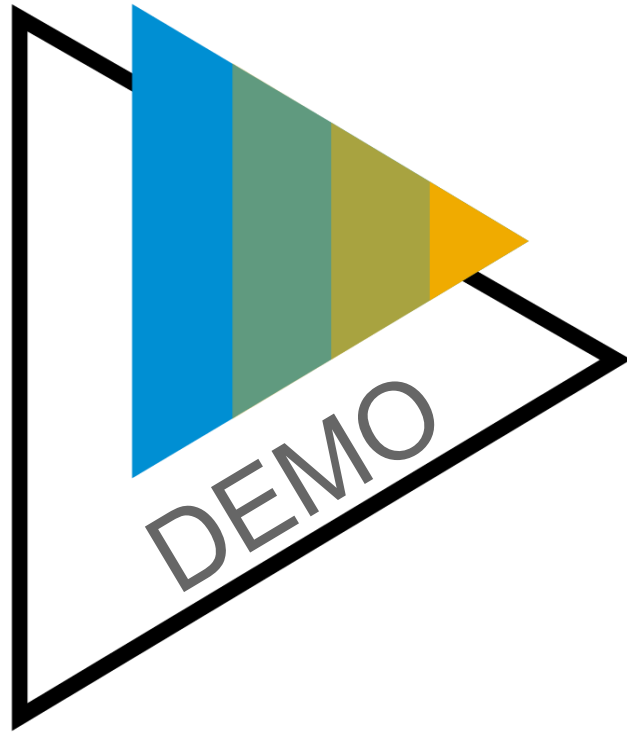
Query Language (CQL)

- 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  
  
};
```

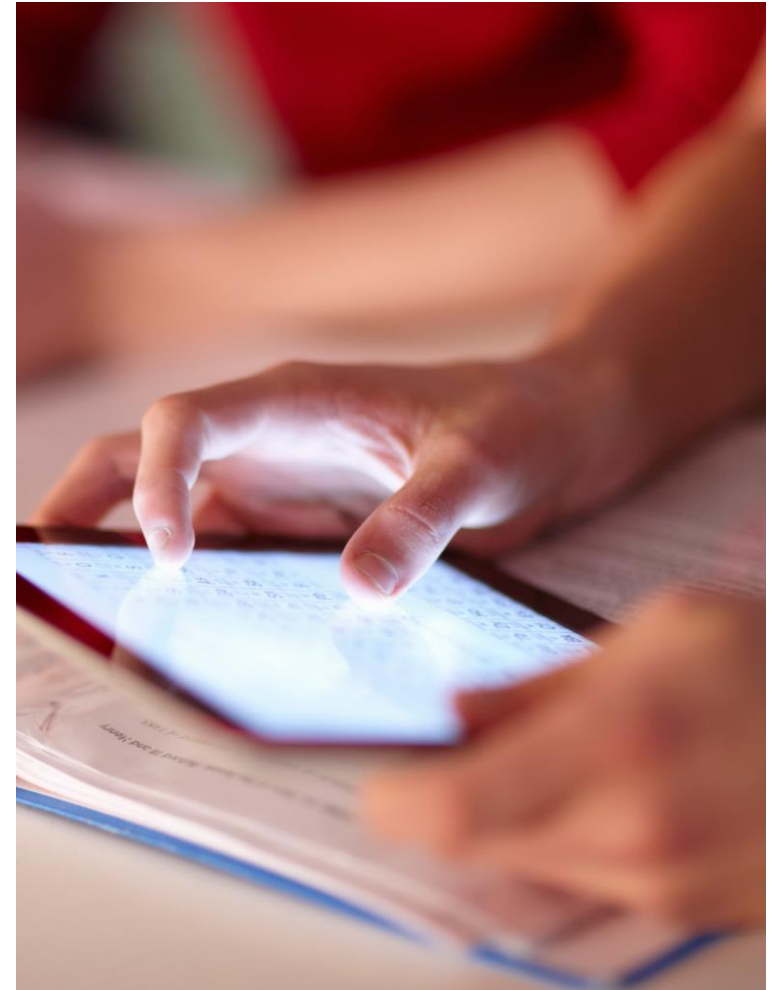
Getting Started with Core Data Services (CDS)

Demo



What you've learned in this unit

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

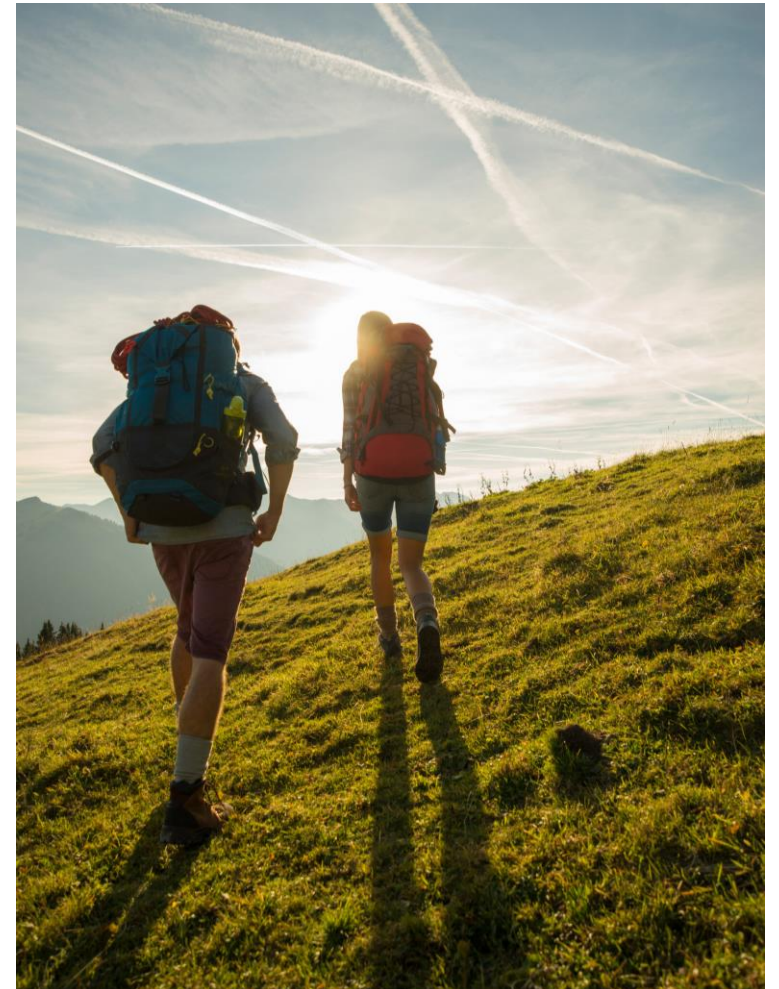


Further reading



Additional Material

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



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Week 1: Introducing SAP Cloud Application Programming Model

Unit 4: Your First App Using Node.js with SAP Cloud Application Programming Model

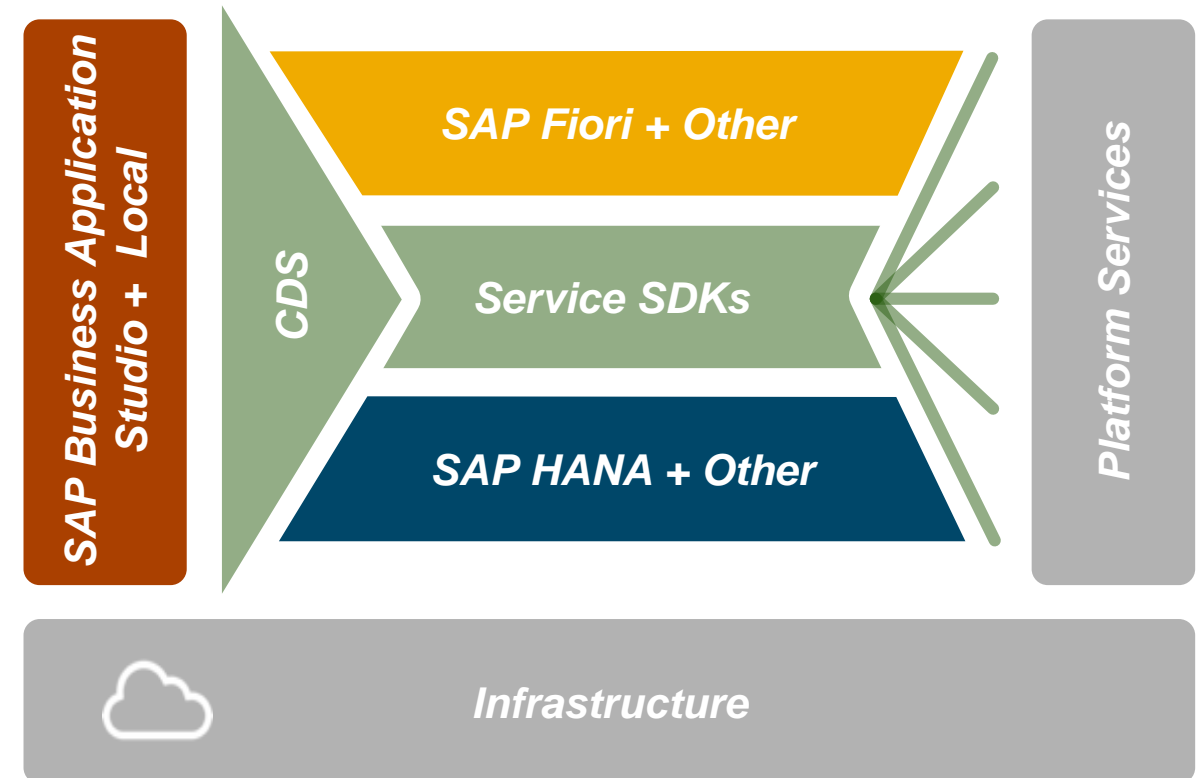
Your First App Using Node.js with SAP Cloud Application Programming Model

Node.js for business service development



Node.js

- Asynchronous event-driven JavaScript runtime
- Built on top of Chrome's V8 engine
- One language for front and back-end development

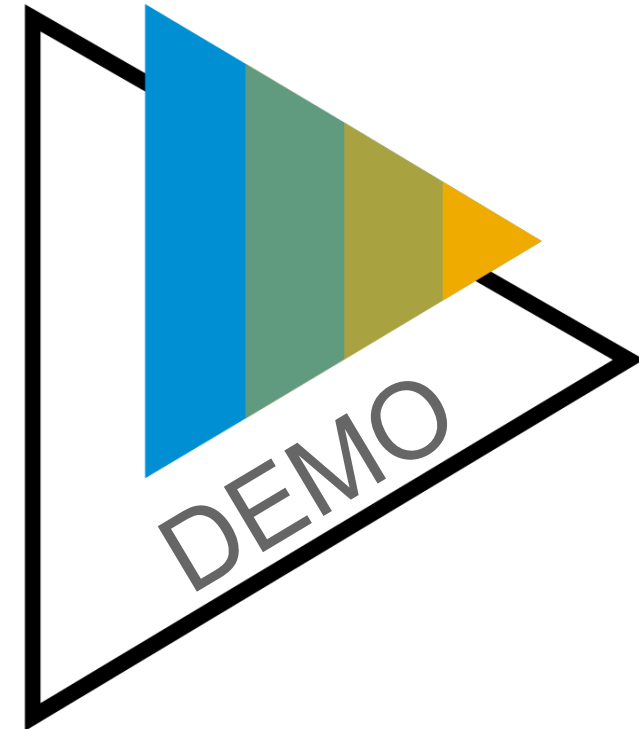




Demo Scenario

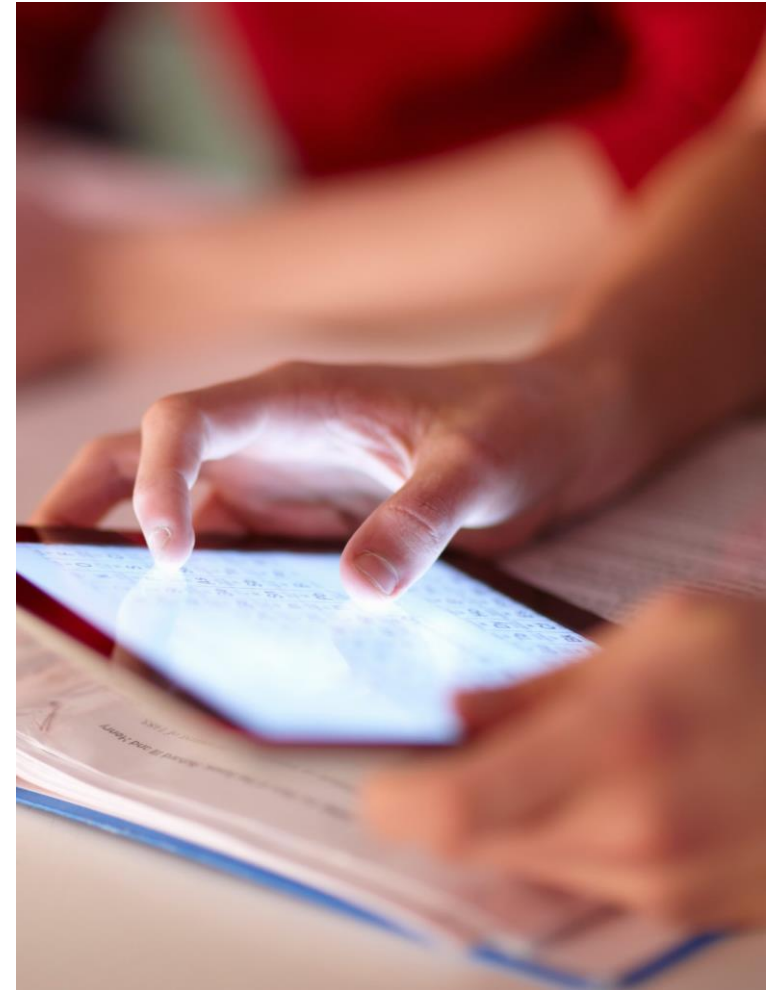
You will build a Node.js application – a **Bookshop**.
Its data model consists of

- Books
- Authors
- Orders



What you've learned in this unit

- How to create a Node.js application using the SAP Cloud Application Programming Model
- How to run a service with the CDS command line tool
- Recommended path for (local) development using SQLite and "cds watch"



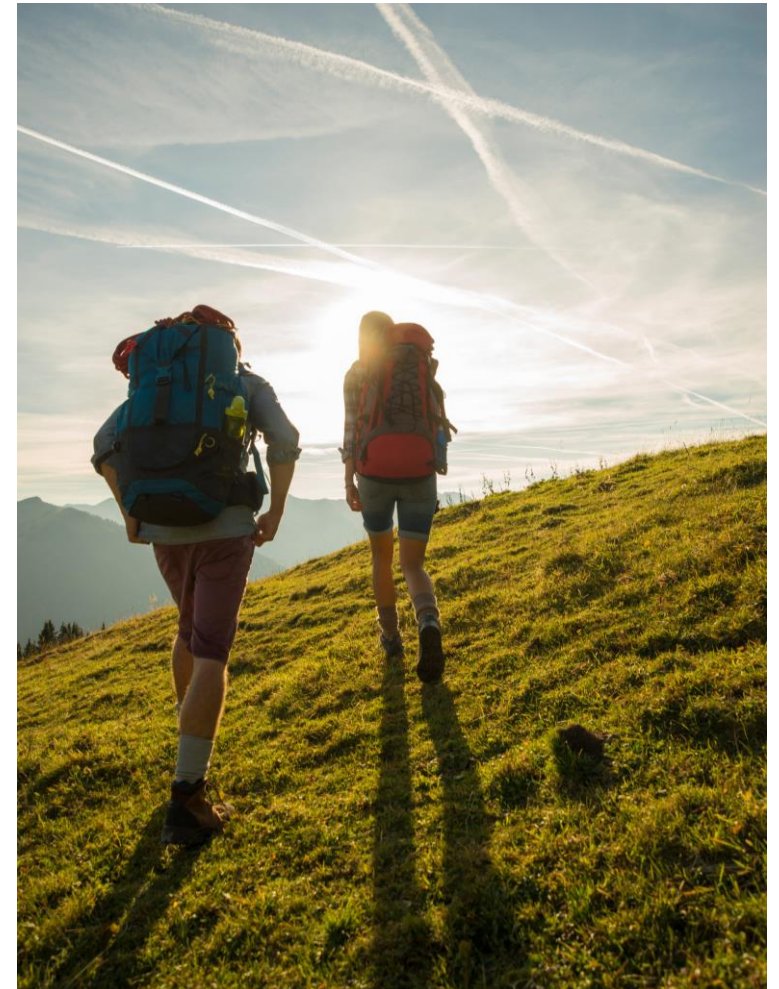
Your First App Using Node.js with SAP Cloud Application Programming Model

Further reading



Additional Material

- [Official documentation](#)
- [Getting Started Guide](#)
- [Blogs Cloud Application Programming Model](#)
- [Starter Scenario](#)
- [TechEd Replay](#)



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