Programmiermodelle für Unternehmensanwendungen

Cloud Application Development Kit for Scala

EXTERNAL

Arne Ludwig
ICN Marmolata
June, 2018

THE BEST RUN SAP

The SAP Innovation Center Network

2011 SAP Innovation Center founded to explore possibilities of HANA, based at Hasso Plattner Institute.

2013 Move to first building at Campus Jungfernsee (Potsdam, Germany) with around 40 employees.

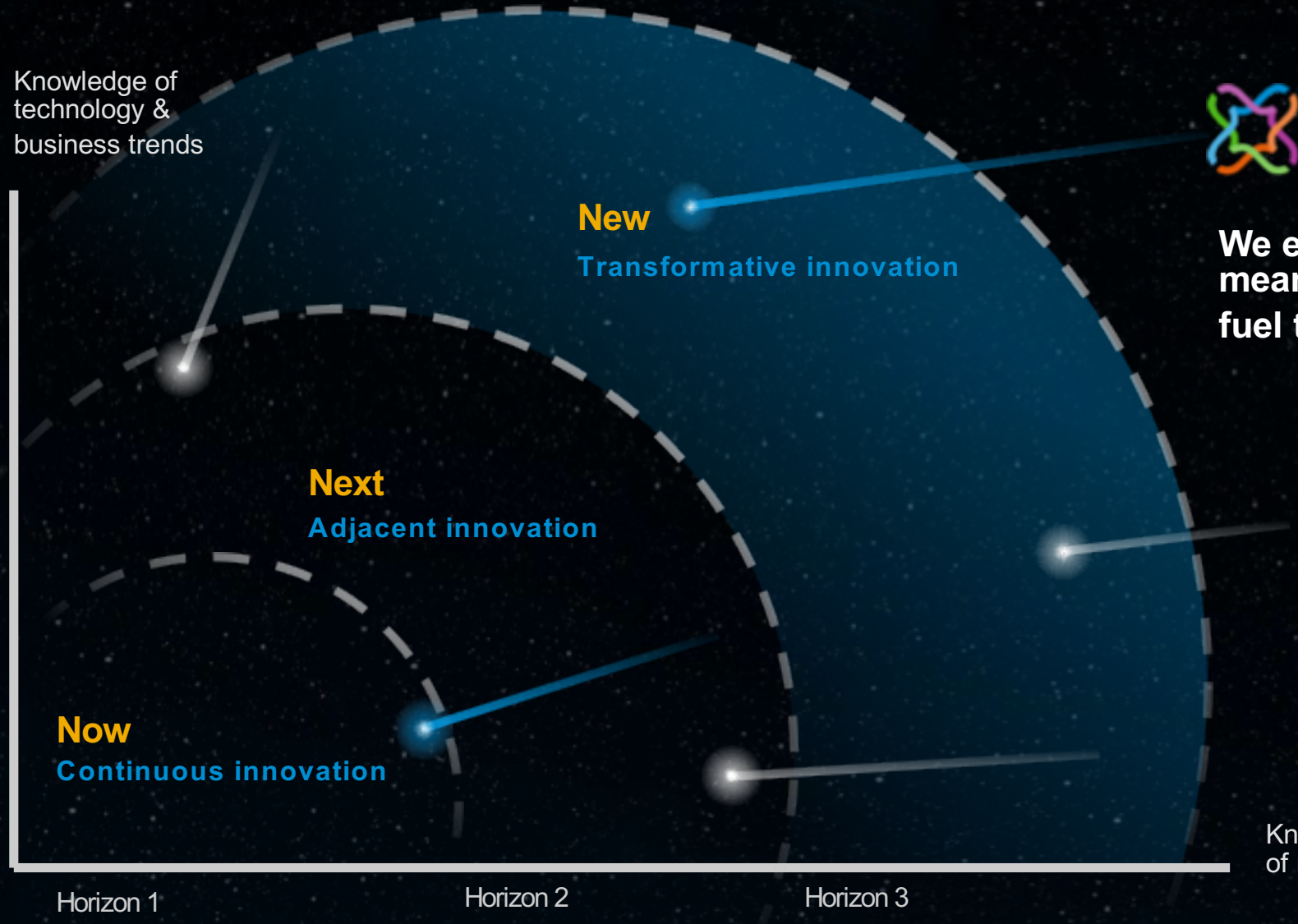
2015 Establishment of the global SAP Innovation Center Network (ICN) with additional teams in Silicon Valley, Dresden, Walldorf, St. Gallen, Ra'anana, Singapore, Nanjing, Brisbane and Bangalore.

2016 Appointment of Juergen Mueller as SAP Chief Innovation Officer. (Global responsibility for driving innovation across all of SAP)

2018 The SAP Innovation Center Network is powered by more than 250 engineers, designers, product experts, and business developers.

© 2018 SAP SE or an SAP affiliate company. All rights reserved.

Our Mission

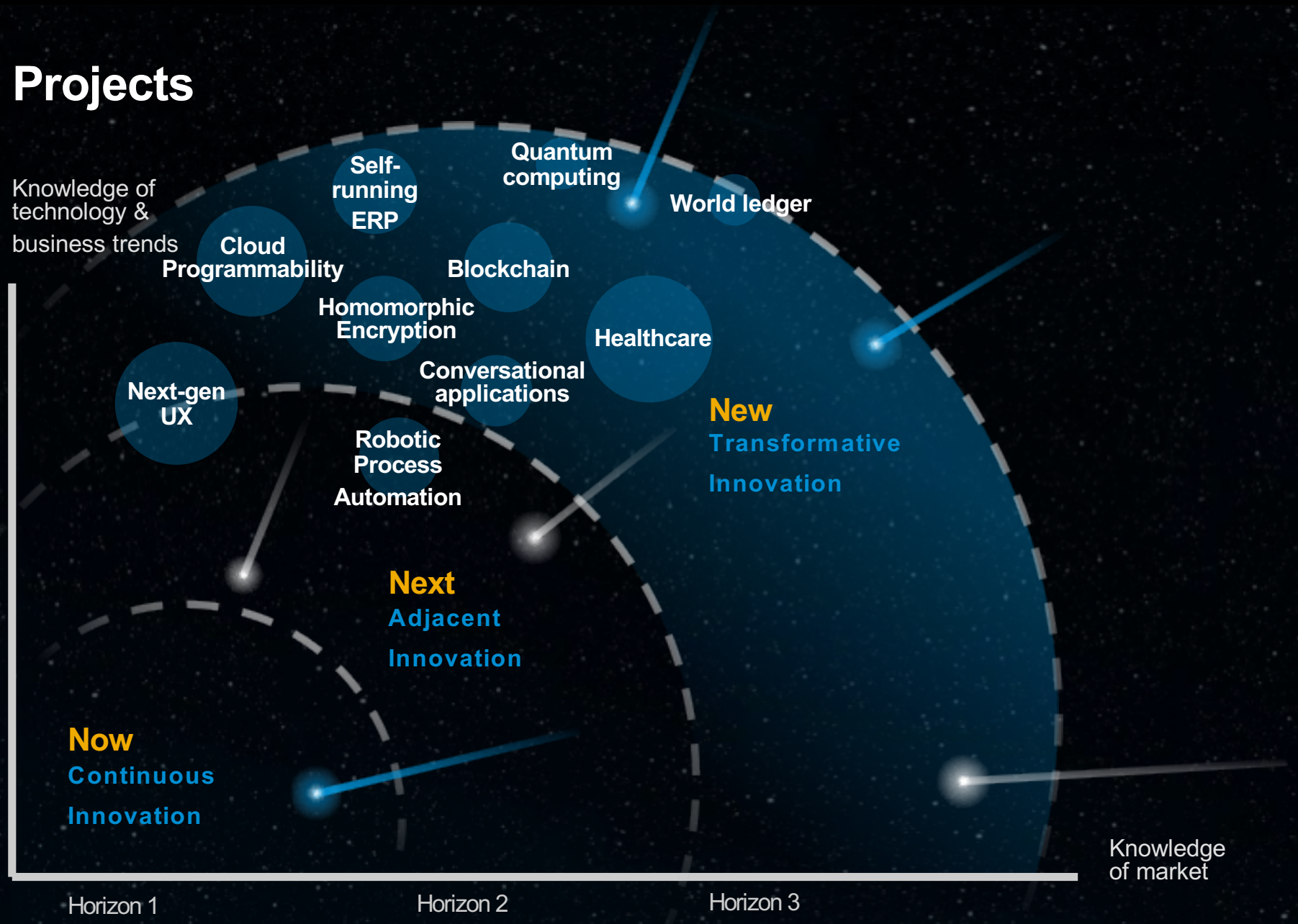


SAP Innovation Center Network

We explore and develop meaningful new technologies to fuel transformative growth at SAP.

© 2018 SAP SE or an SAP affiliate company. All rights reserved.

Projects



© 2018 SAP SE or an SAP affiliate company. All rights reserved.

Agenda

I. Scaling Development at SAP

II. Scala

III. Cloud application development kit for Scala

IV. Demo

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scaling Development at SAP

SAP - Scale

S/4HANA
The digital core

ERP with modules for
finance, accounting, controlling, procurement, sales, manufacturing, plant maintenance, project system, product lifecycle management, etc.

31 languages, 61 country versions, 23 industries

on-prem and cloud

SAP HANA, **ABAP**, HTML5/UI5

486 pages

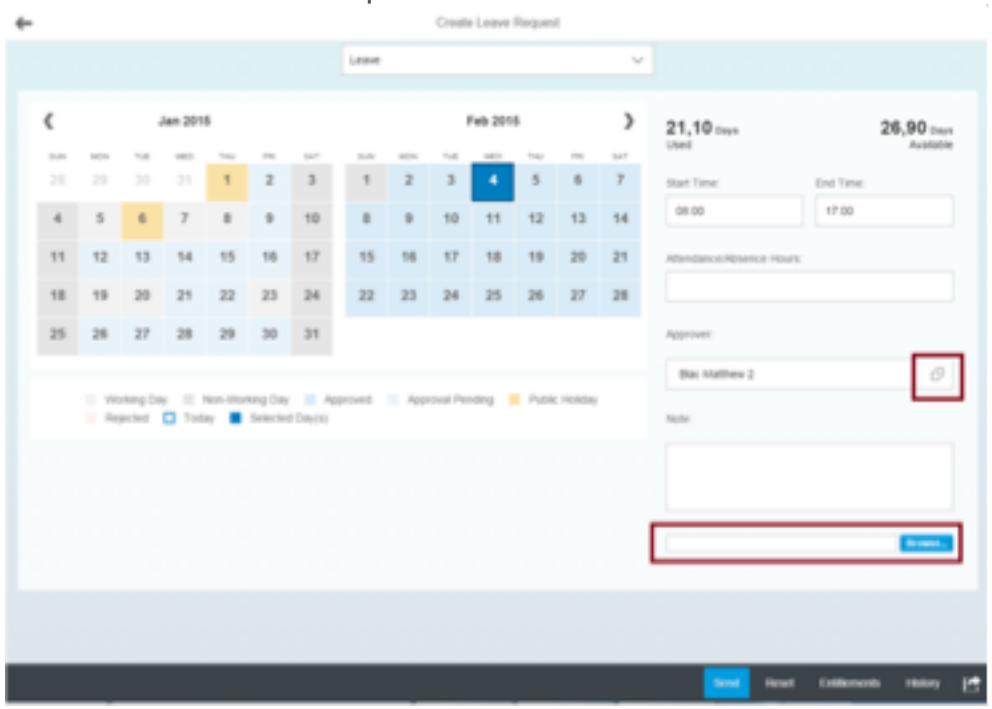
© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scaling Development

SAP is experienced in scaling development

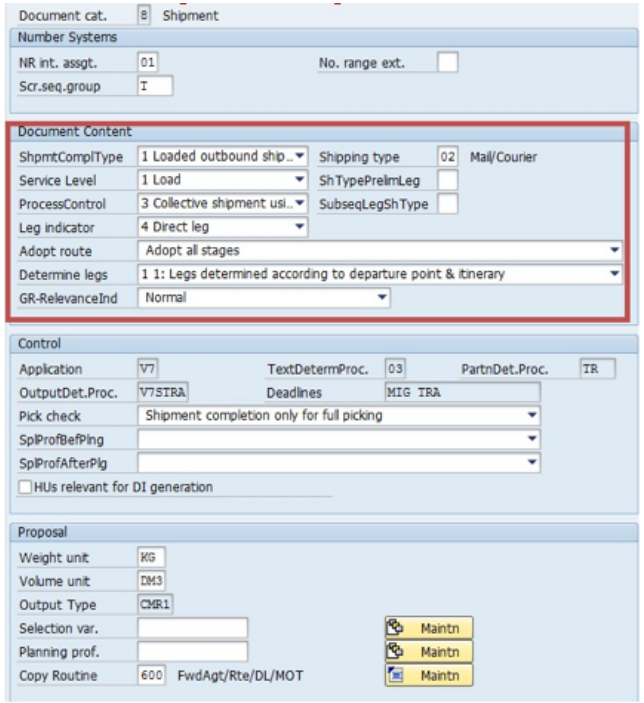
| S/4HANA feature set from

Leave Requests



to

Freight Cost Calculation



© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scaling Development

- **ABAP** is SAP's current foundation for scalability of development

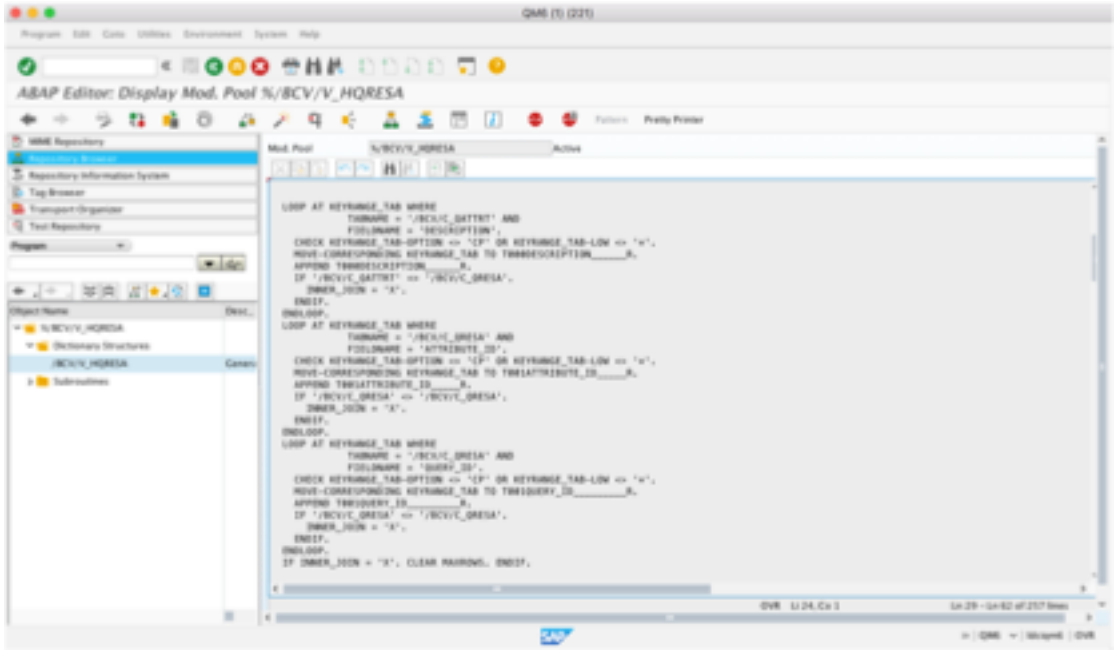
© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

ABAP

Tailored to building (SAP) business applications (1982)

SAP NetWeaver Application Server (Development and runtime environment)

ABAP = **A**llgemeiner **B**erichtsauf**a**rbeitungs**p**rozessor (formerly)
Advanced **B**usiness **A**pplication **P**rogramming (nowadays)



© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

388,000+
Customers

91,100+
Employees

17,300+
Partners

25
Industries

€23.77B
Revenue in 2017

92%
of the Forbes Global 2000 are SAP Customers

#28
of Fortune's 2017 top 100 places to work

180+
Countries

SAP Cloud Platform

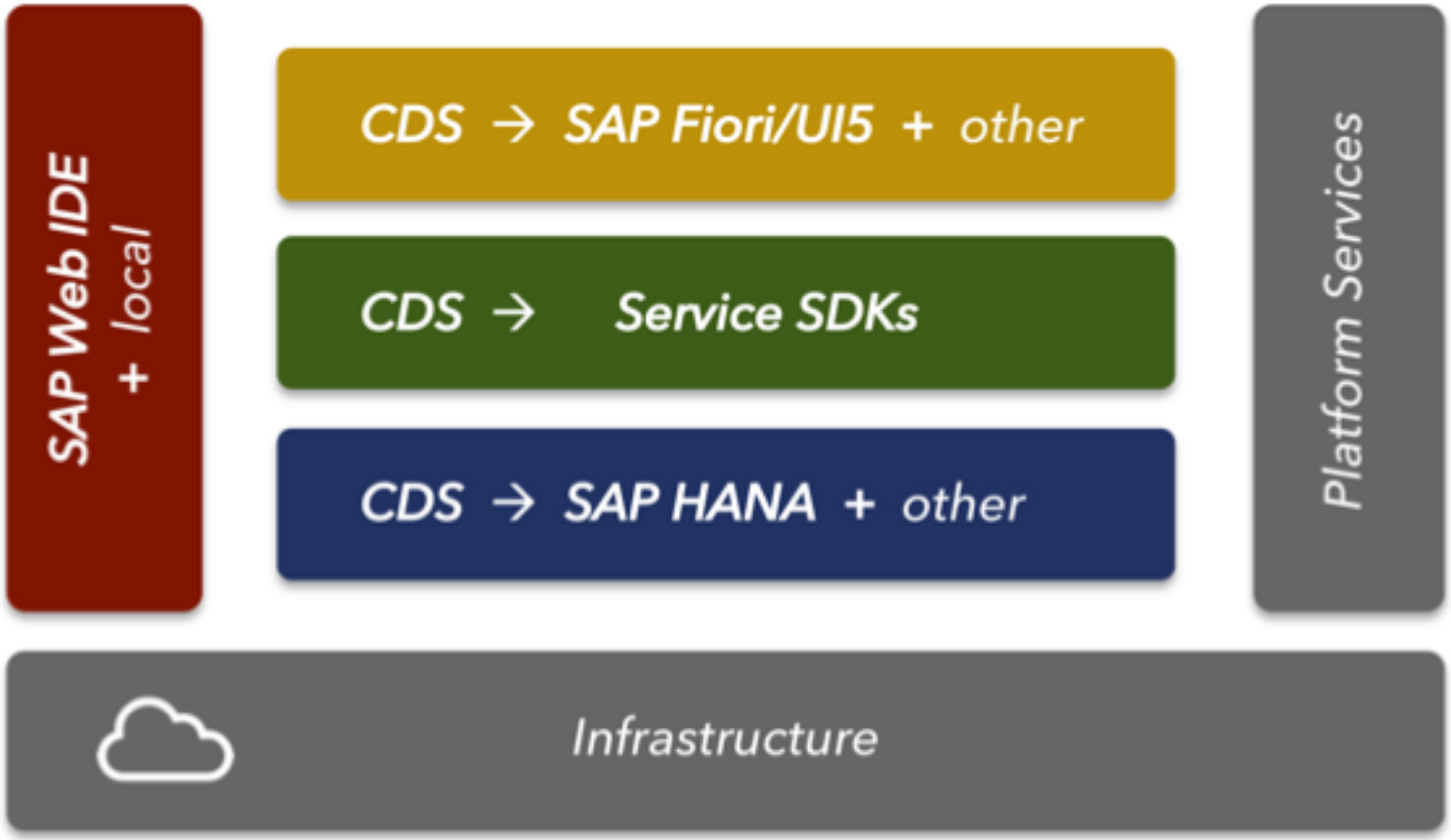
SAP Cloud Platform is an open platform-as-a-service (PaaS).

- Based on Cloud Foundry
- Includes
  - On-premise interoperability
  - Data storage
  - Security
  - APIs, e.g., Successfactors, Concur, S/4HANA
- Embrace variety, e.g., ABAP, Java, Node.JS, Scala

https://cloudplatform.sap.com/index.html

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Application Programming Model for SAP Cloud Platform



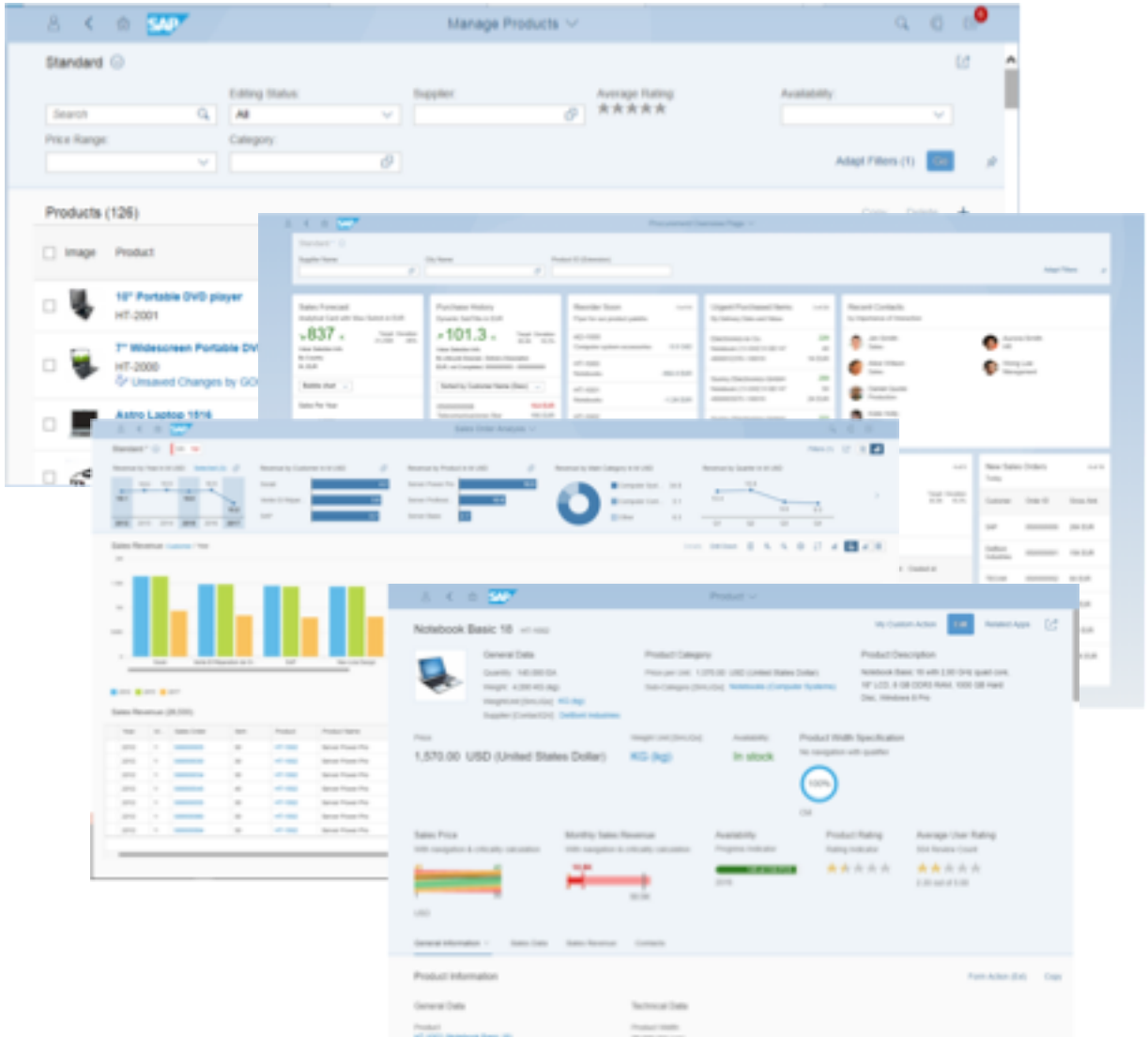
https://blogs.sap.com/2018/06/05/introducing-the-new-application-programming-model-for-sap-cloud-platform/

https://help.sap.com/viewer/65de2977205c403bbc107264b8eccf4b/Cloud/en-US/00823f91779d4d42aa29a498e0535cdf.html

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Fiori Elements

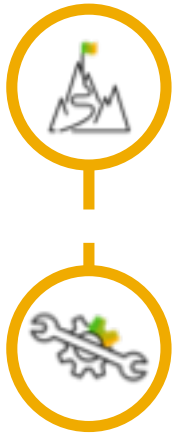
- Approach
  - Templates
  - UI app as generic as possible
  - App-specific logic in the backend
  - Avoid low-level (hard to maintain) JavaScript



© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scala

Cloud Application Development Kit for Scala
Project description



GOAL

Scale development for the SAP Cloud Platform

- Cloud application development kit for Scala
  (set of Scala libraries)

Building Enterprise Applications with a focus on

- Performance ← Concurrency Model
- Development Efficiency ← Frontend / Backend in the same programming language; Better IDE support; Modular building blocks
- Maintainability ← Types

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scala = Simplified + Functional Programming

(fully compatible to Java)

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Why Scala?

„I think the lack of reusability comes in object-oriented languages, not functional languages. Because the problem with object-oriented languages is they've got all this implicit environment that they carry around with them. You wanted a banana but what you got was a gorilla holding the banana and the entire jungle.

If you have referentially transparent code, if you have pure functions — all the data comes in its input arguments and everything goes out and leave no state behind — it's incredibly reusable."

– Joe Armstrong, creator of Erlang

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scala – Simplicity for the JVM

```java
public class HelloJava {
    public static void main(String[] args) {
        System.out.println("Hello World!");
    }
}
```

"HelloJava.java" 5L, 122C

```scala
object HelloScala {
  def main(args: Array[String]): Unit =
    println("Hello World!")
}
```

"HelloScala.scala" 4L, 90C

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scala – Simplicity for the JVM

```java
import java.util.*;

public class ListJava {

  void test() {

    List<String> lst =
      new LinkedList<String>();

    lst.add("1");
    lst.add("2");
    lst.add("3");

    List<Integer> ints =
      new LinkedList<Integer>();

    for (String s : lst) {
      ints.add(Integer.parseInt(s));
    }
  }
}

"ListJava.java" 22L, 316C written
```

```scala


object TestList {

  def test: Unit = {

    val lst =
      List("1", "2", "3")



    val ints =
      lst.map(x => x.toInt)



  }
}

"ListScala.scala" 22L, 144C written
```

© 2018 S.

Scala – Simplicity for the JVM

```java
public class ProductJava {
  private int id;
  private String category;

  public ProductJava(int id, String c) {
    this.id       = id;
    this.category = c;
  }

  public int getId() {
    return id;
  }

  public String getCategory() {
    return category;
  }

  public boolean equals(Object o) {
    if (o instanceof ProductJava)
      return false;
    ProductJava p = (ProductJava) o;
    return
      id == p.id &&
      ((category == null
        && p.category == null)
       || category.equals(p.category));
  }

  public int hashCode() {
    return 7 * id + 13 * ((category == nu
ll) ? 42 : category.hashCode());
  }
}
"ProductJava.java" 32L, 635C written
```

```scala
case class ProductScala(
  id       : Int,
  category: String
)
~
~
~
```

Scala – Simplicity for the JVM

ScalaFuture.scala (~/repos/Marmolata/Information/leadership_offsite_2018_q1/code_examples) - VIM2

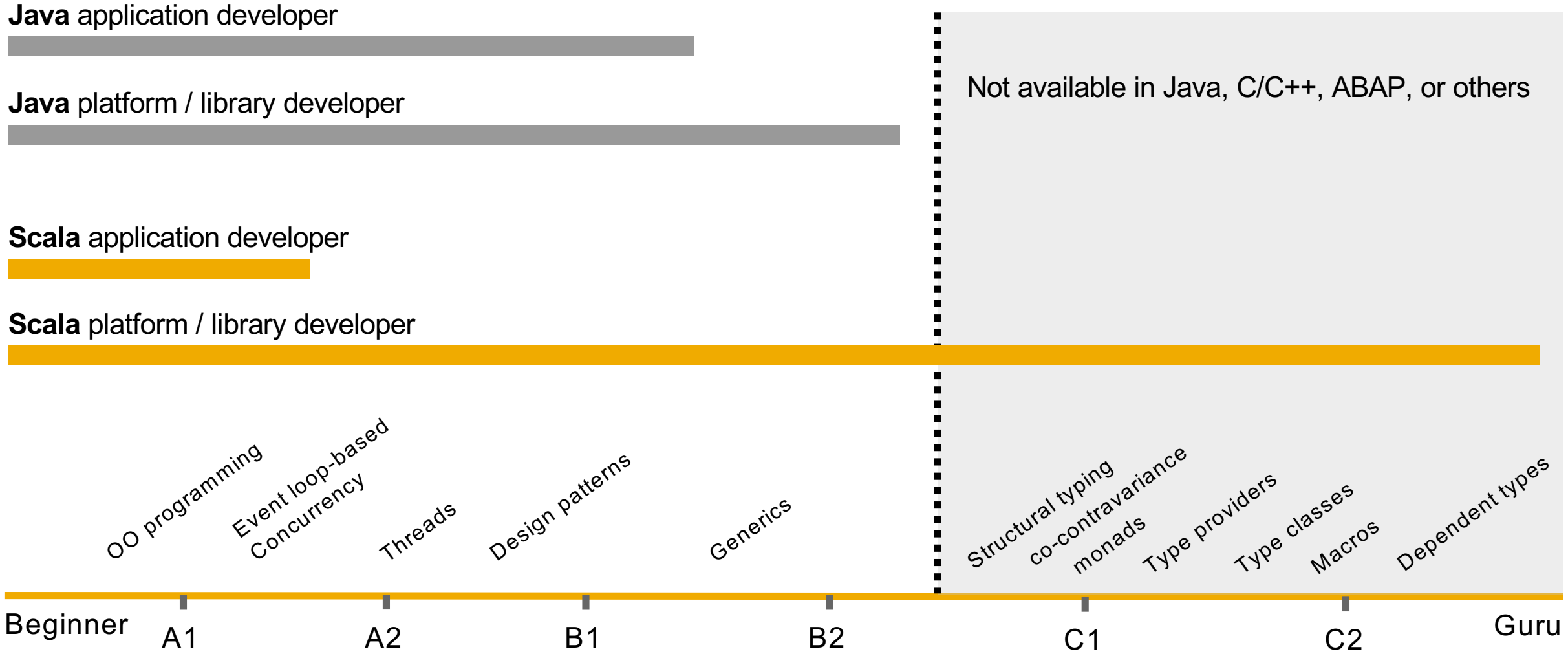
```scala
import scala.concurrent.Future
import scala.concurrent.ExecutionContext.Implicits.global

trait ScalaFuture {
  def getX: Future[Int]
  def getY: Future[Int]
  def f(x: Int, y: Int): Future[Int]

  def compute: Future[Int] =
    for {
      x <- getX
      y <- getY
      result <- f(x, y)
    } yield (result)
}
~
```

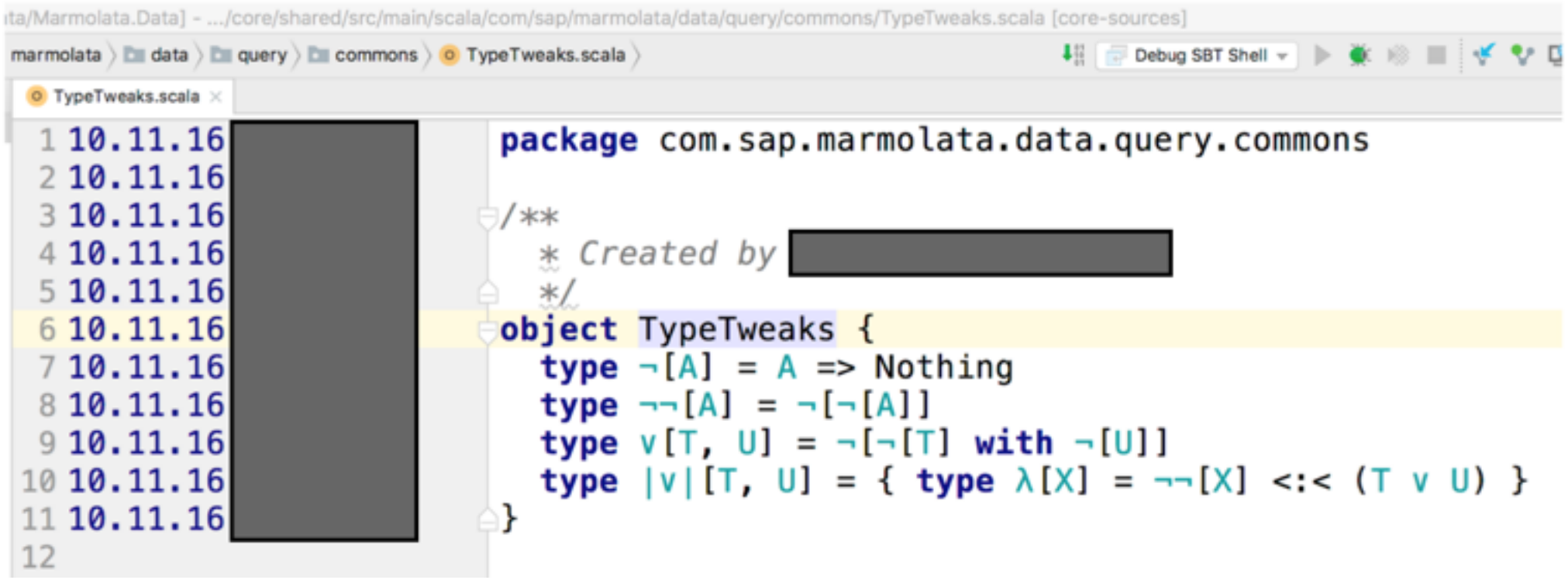
© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scala
Feature Sprectrum: Java vs. Scala

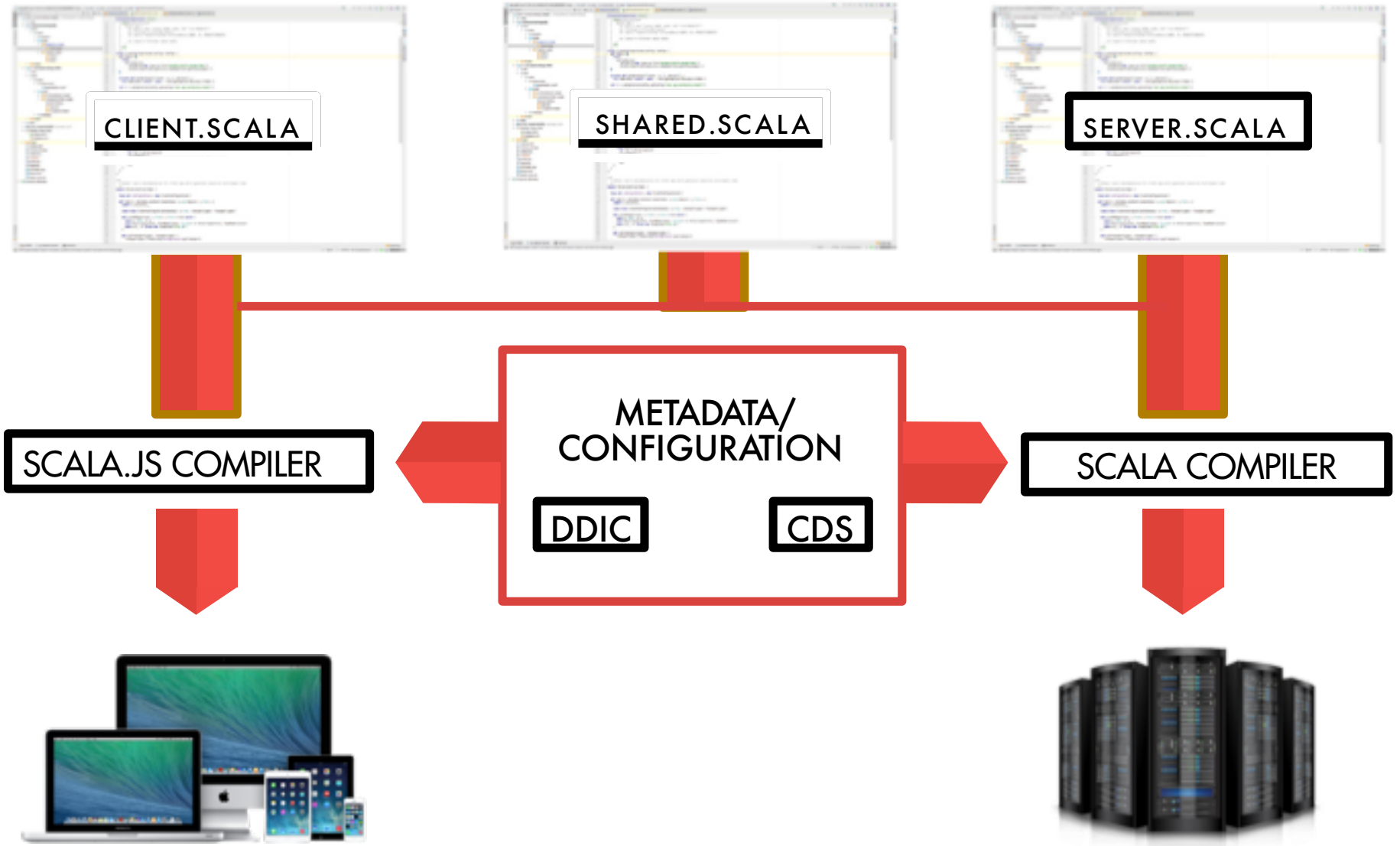


© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Risks



© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL



© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Cloud Application Development Kit for Scala

Cloud Application Development Kit for Scala

Features

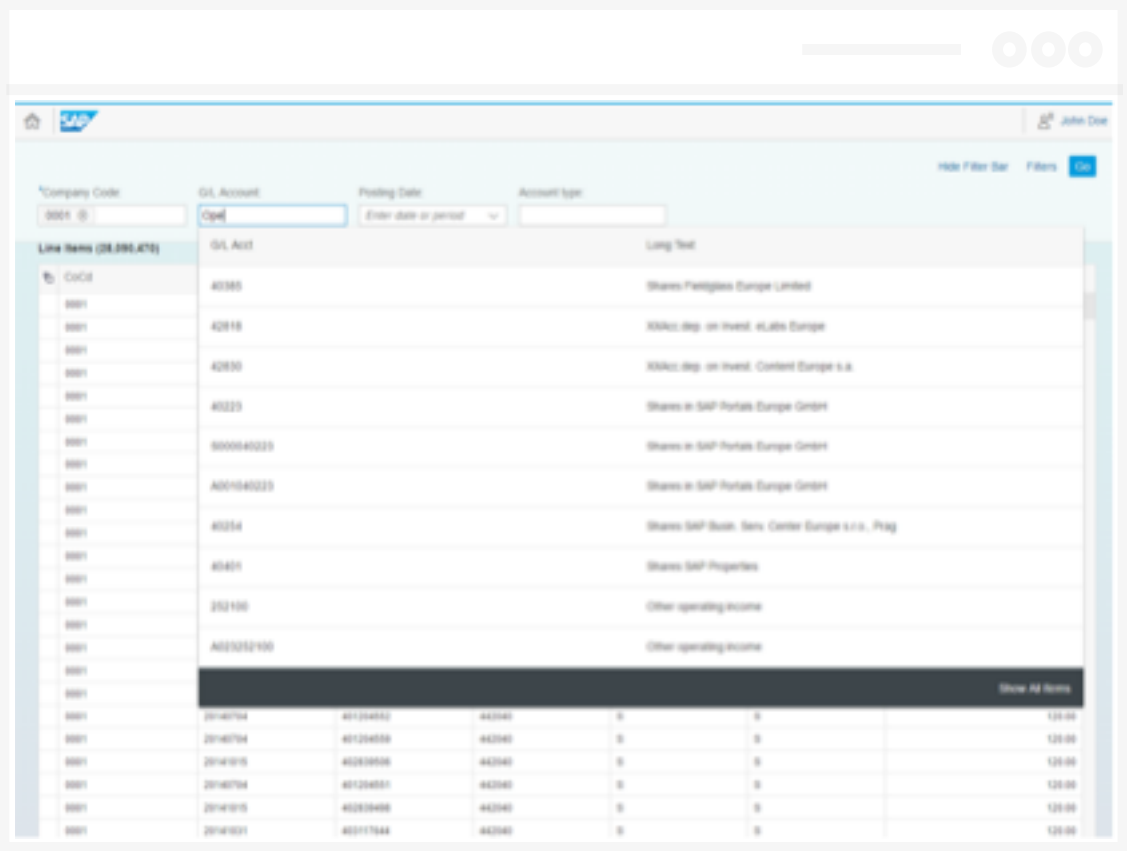
- Read from/write to **SAP data sources**:
  - S/4 (via OData or CDS), ERP (DDIC + DB-level access), etc.
  - Homogeneous query language for many SAP data sources (developer productivity)

```
(sql"select FirstName, LastName, BirthDate from $Persons"
```

- Write **Fiori/SAP UI 5 applications** using high-level abstractions **in Scala**:
  - Scala code compiles to JavaScript, using facades for UI5
  - Flexible databinding and **reactive** library for UI programming
  - Integration into **Fiori Launchpad**

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Scala
Financial Accounting Example



```
@MarmolataClient
object DemoApp {
  val query = SQL"select BUKRS, H_BUDAT, BELNR, HKONT, SHKZG, KOART, DMBTR from BSEG"

  val filter = FilterControl(dataSource = query)
    .withMandatoryFields(BUKRS)
    .withHiddenFields(BELNR, SHKZG, DMBTR)

  val table = TableControl(dataSource = filter.filteredQuery)

  val render = filter above table
}
```

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Demo

Open Architecture

Attract Talent

New generation of developers

- Want to work with modern and powerful tools (Scala (2007) not Java (1995))
- Want to work in open-source environment
- consider their github.com account as their business card
  - A tech company ideally attracts the most talented developers
  - A tech company cannot effort losing the most talented developers
- We will release the Scala project as Open Source

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Summary

Scale development for the cloud age

- Development Efficiency
- Performance
- Maintainability

Attract talent

© 2018 SAP SE or an SAP affiliate company. All rights reserved. I EXTERNAL

Thank you.

Contact information:

Dr. Arne Ludwig
ICN Marmolata

arne.ludwig@sap.com

THE BEST RUN SAP

Follow all of SAP

www.sap.com/contactsap

© 2018 SAP SE or an SAP affiliate company. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP SE or an SAP affiliate company.

The information contained herein may be changed without prior notice. Some software products marketed by SAP SE and its distributors contain proprietary software components of other software vendors. National product specifications may vary.

These materials are provided by SAP SE or an SAP affiliate company for informational purposes only, without representation or warranty of any kind, and SAP or its affiliated companies shall not be liable for errors or omissions with respect to the materials. The only warranties for SAP or SAP affiliate company products and services are those that are set forth in the express warranty statements accompanying such products and services, if any. Nothing herein should be construed as constituting an additional warranty.

In particular, SAP SE or its affiliated companies have no obligation to pursue any course of business outlined in this document or any related presentation, or to develop or release any functionality mentioned therein. This document, or any related presentation, and SAP SE's or its affiliated companies' strategy and possible future developments, products, and/or platforms, directions, and functionality are all subject to change and may be changed by SAP SE or its affiliated companies at any time for any reason without notice. The information in this document is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. All forward-looking statements are subject to various risks and uncertainties that could cause actual results to differ materially from expectations. Readers are cautioned not to place undue reliance on these forward-looking statements, and they should not be relied upon in making purchasing decisions.

SAP and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP SE (or an SAP affiliate company) in Germany and other countries. All other product and service names mentioned are the trademarks of their respective companies.

See www.sap.com/corporate-en/legal/copyright/index.epx for additional trademark information and notices.

THE BEST RUN SAP