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Exploring the Era of Microservices and API Integrations with Ballerina

Hello!

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About this Session

Mastering Web Backend Fundamentals

Mastering Data - Data Persistence and Visualization [Completed]

- Learn the importance and the basics of data and data persistence
- Discover how to persist data in various data stores with ease
- Create interactive visualizations with Ballerina, while learning the basics

Mastering API Integrations and microservice architecture [Today]

- Learn the importance of API integrations and microservices architecture in modern world
- Learn the Ballerina language essentials for integration
- Participate in the hands-on session and the reward challenge to enhance your skills

Application development Hackathon [TBA]

Coming Up

1. Understanding integration and microservice fundamentals
2. The perfect fit for effortless Integrations: Ballerina coming into the picture
3. Mastering fundamental concepts of Ballerina
4. Hands-on Session: Designing and implementing microservices with Ballerina
5. The Rewards Challenge

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“Software, in its essence, is the enabler of the digital future”

- Ginni Rometty (Former CEO of IBM)

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Integration Fundamentals

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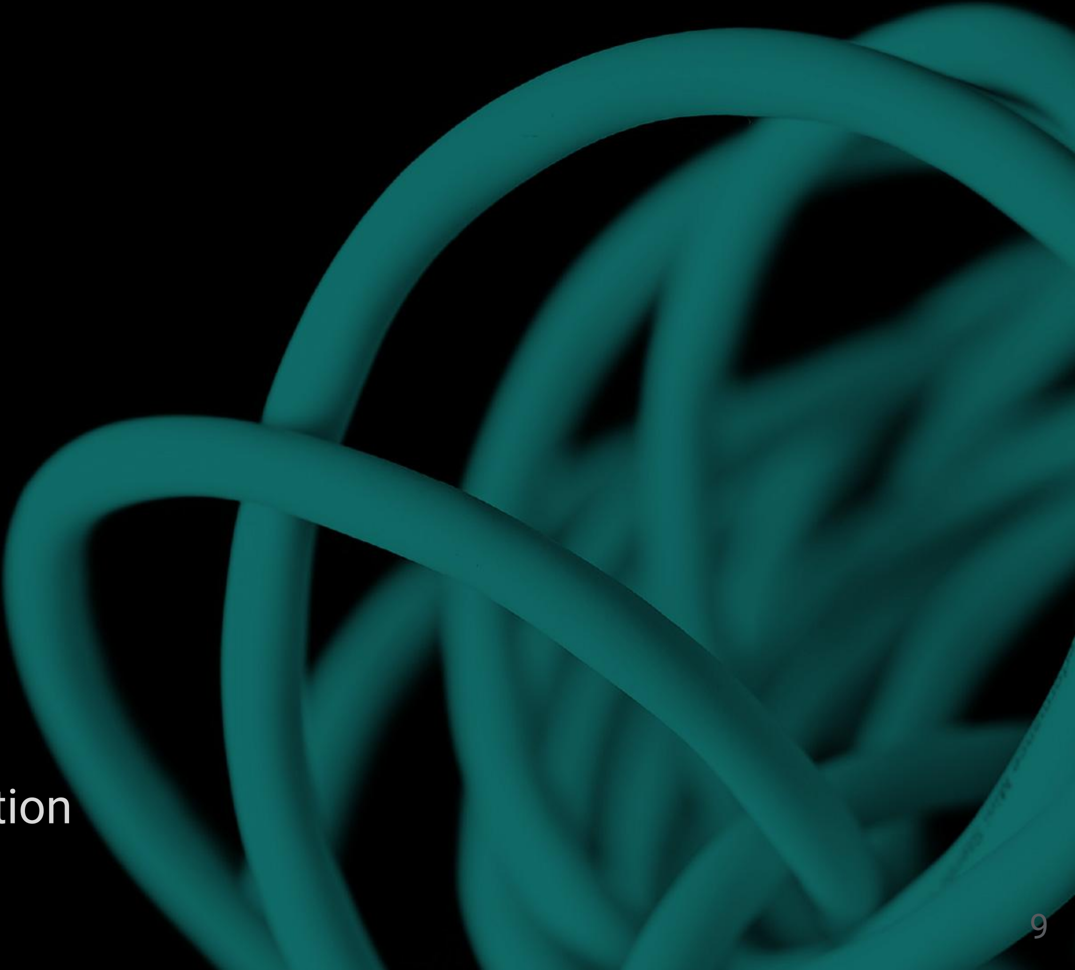
Integration: Simplified

“Integration like putting together a jigsaw puzzle.

It's when we make different parts fit together, so the whole thing works nicely!”

Types of Integration

- API Integration
- Database Integration
- Middleware Integration
- Cloud Integration
- User Interface (UI) Integration
- Mobile App Integration
- Continuous Integration
- IoT (Internet of Things) Integration



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Application Programming Interface (API)

- has a set of rules and protocols that allows different software applications to communicate with each other.
- define the methods and data formats that applications can use to request and exchange information.

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Understanding Ballerina Basics

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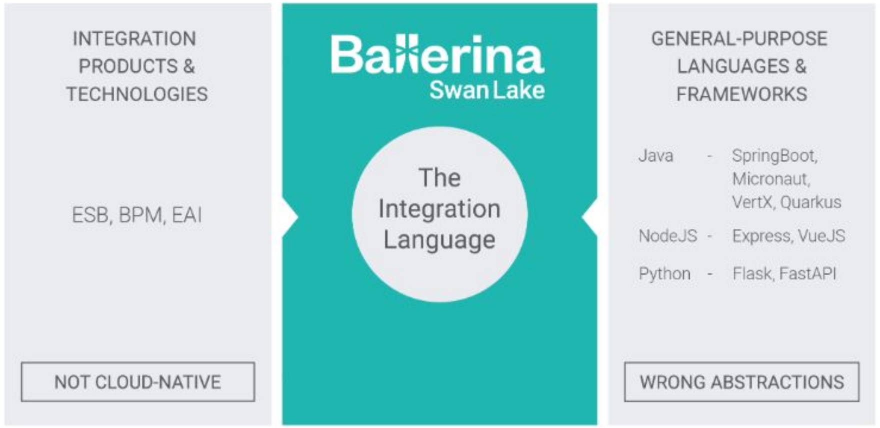
- Fully open-source programming language, powered by WSO2
- 6+ years of effort with 300+ contributors
- Data Oriented Programming (DOP) paradigm
- Both textual syntax and graphical form

Ballerina for Integration

- Language made specifically for integration and microservices
- First class support for network endpoints
- Rich library - A collection of packages to help writing and connecting to various endpoints
- Built-in data types suitable for network communication



Understanding Ballerina Basics: Data Types

- **`int`**: Integer data type (64-bit signed integer)
- **`float`**: Floating-point data type (64-bit double-precision floating-point)
- **`boolean`**: Boolean data type (true or false)
- **`string`**: String data type (a sequence of Unicode characters)
- **Arrays**: An array can be used to hold a list of values of a given type
- **Maps**: The `map<T>` type is a data structure to store key-value pairs, with a `string` key and a value of a given type

```
// Integer
int i = 10;

// Float
float f = 12.34;

// Boolean
boolean b = true;

// String
string s = "Hello World!";

// Array of Strings
string[] names = ["John", "Doe", "Jane", "Doe"];

// Map of integers
map<int> ages = {
    "John": 30,
    "Jane": 20,
    "Karen": 40
};
```

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Understanding Ballerina Basics: Data Types

- **nil**: Ballerina's version of `null` is called nil and written as `()`
- **Union Types**: `T1|T2` is the union of the sets described by `T1` and `T2`
- **Optional Types**: `T?` means the union of `T` and `()` equivalent to `T|()`
- **any**: Union type containing all the Ballerina types

```
// Nil
var n = ();

// Union (either string or int)
string|int x = 10;

// Optional (either string or nil)
string? y = 10;

// any array
any[] data = [1, "hello", 3.4, true];
```

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Understanding Ballerina Basics: Data Types

- **JSON**: Used to send data over the network. Union of simple basic types `()|boolean|int|float|decimal|string|json[]|map<json>`
- **XML**: A markup language and file format for storing, transmitting, and reconstructing arbitrary data

```
json profile = {
    name: "John Doe",
    age: 30,
    address: {
        city: "Colombo",
        country: "Sri Lanka"
    }
};

xml x1 = xml `<book>The Lost World</book>`;
```

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Understanding Ballerina Basics: Records and Objects

- **Record**: A collection of specific named fields where each field has a type for its value.
- **Object**: Type definition without any implementation. It is similar to a Java interface.

```
type Address record {
    int number;
    string street;
    string city;
};

type Animal object {
    string name;

    function run() returns int;
};
```

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Understanding Ballerina Basics: Functions

- Functions are building blocks of an application
- The `function` keyword is used to define functions in Ballerina
- A function can have zero or more input arguments and can return a value (Not returning anything means returning nil)

```
function add(int a, int b) returns int {
    return a + b;
}
```

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Understanding Ballerina Basics: Hello World!

- Execute the `$ bal new hello_world` to create a new Ballerina project
- Code:

```
import ballerina/io;


public function main() {
    io:println("Hello, World!");
}
```

- The `main` function is the entry point of a Ballerina program
- Execute `$ bal run` to run the program

Activity

1. Write a Ballerina program to get the sum of all the prime numbers below 1000.
2. Print the output to the STDOUT.

? ? ?

Activity

1. Write a Ballerina program to get the sum of all the prime numbers below 1000.
2. Print the output to the STDOUT.

```
import ballerina/io;

function isPrime(int n) returns boolean {
    foreach int i in 2 ..< n {
        if n % i == 0 {
            return false;
        }
    }
    return true;
}

public function main() {
    int sum = 0;
    foreach int i in 2 ... 1000 {
        if isPrime(i) {
            sum += i;
        }
    }
    io:println("The sum of prime numbers below 1000 is: " + sum.toBalString()); // 76127
}
```

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Networking in Ballerina

Listener, Service, and Client

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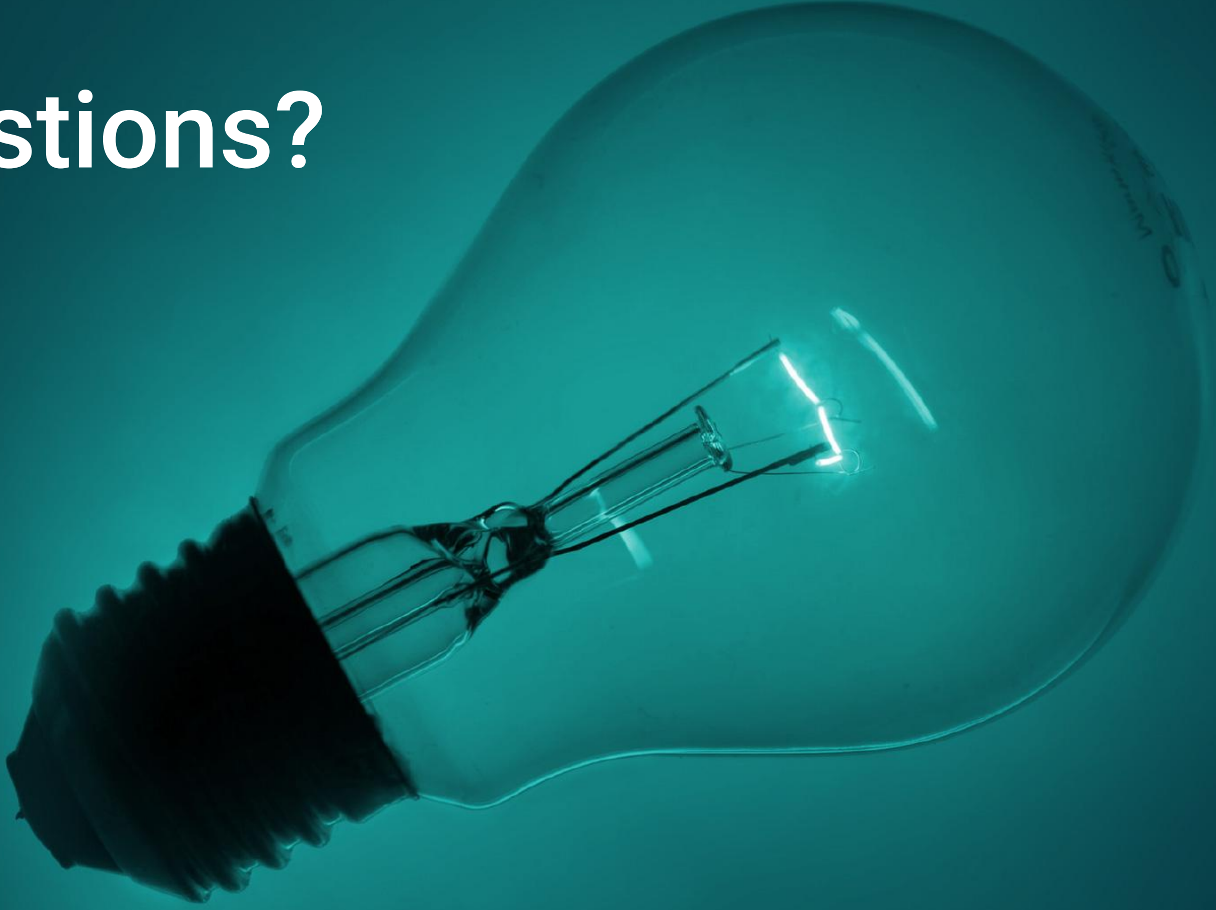
Hands-on Session

https://github.com/ayeshLK/inventory-management

Rewards Challenge

- John is a newly joined employee in WSO2. After his university journey he joined WSO2 Ballerina team.
- As the first task of his office journey, he needs to visit the Github repositories maintained by WSO2 Ballerina team.
- You are expected to help him to complete his tasks using Ballerina.
- Visit https://github.com/SasinduDilshara/student_exercise repository and follow the guidelines in the **ReadMe.md** file.
- **All students** who completed the task will get an **special reward**!.
- If you completed the task, please fill the form and get your reward.

Questions?



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Mini Project

- Do something cool with/about Ballerina
  - A new Ballerina package, published to Ballerina central
  - An article/video about Ballerina
  - Contribute to Ballerina project (Find “Good First Issues”)
  - Make sure your source code/article/video is public
- **Submit your projects** using the below google form
  - https://forms.gle/nopCp3utp7FG3Loq8
- There’s no limit, submit as many entries as you want
- Successful submissions will receive free vouchers for WSO2 practitioner and developer certifications.

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Find out more...

- Learn Ballerina:
  - Ballerina By Example
    - https://ballerina.io/learn/by-example/
  - API Documentation
    - https://lib.ballerina.io/

- Join the Ballerina community

Discord	COLLECTIVES on stackoverflow	X	GitHub
ballerinalang	WSO2 Collective	@ballerinalang	ballerina-lang

Thank you!

If you have any further questions, please raise them in the **Ballerina Discord server.**

https://discord.gg/ballerinalang

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