

Functions

Database Programmability



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1. User-Defined Functions

- Scalar Functions
- Table-valued Functions



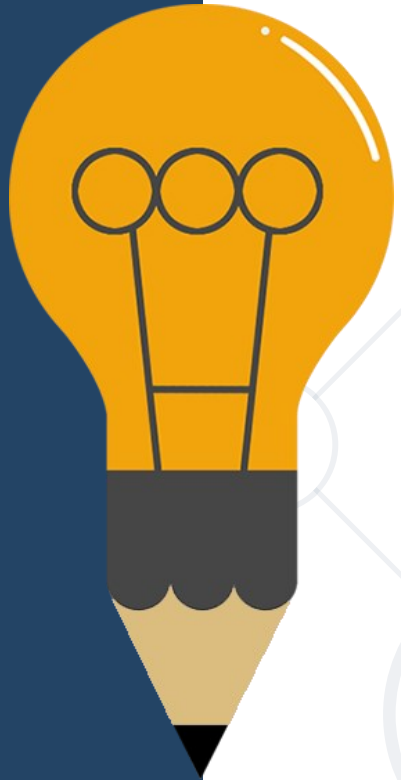


User-Defined Functions

Definition, Usage, Syntax

Functions: Basic Definition

- At its core, a function **receives an input** and **produces an output**



Types of User-Defined Functions

- **Scalar functions**
 - Similar to the **built-in functions**
 - Returns a **single value**
- **Table-valued functions**
 - Similar to **a view with parameters**
 - **Returns a table** as a result of a single SELECT statement
 - Inline table-valued function (TVF)
 - Multi-statement table-valued function (MSTVF)



Functions: Limitations

- User-defined functions **cannot** be used to perform actions that **modify** the database state
- User-defined functions **cannot** return **multiple** result sets
- User-defined functions cannot make use of **dynamic SQL** or **temp tables**. Table variables are allowed.
- User-defined functions can be nested up to 32 levels
- Error handling is restricted in a user-defined function
UDF does not support **TRY...CATCH**, **@ERROR** or **RAISERROR**



Create Functions (Scalar)

```
CREATE FUNCTION udf_ProjectDurationWeeks (@StartDate DATETIME,  
@EndDate DATETIME)  
RETURNS INT  
AS  
BEGIN  
    DECLARE @projectWeeks INT;  
    IF (@EndDate IS NULL)  
    BEGIN  
        SET @EndDate = GETDATE()  
    END  
    SET @projectWeeks = DATEDIFF(WEEK, @StartDate, @EndDate)  
    RETURN @projectWeeks;  
END
```

Function Name

Parameters

Return Type

Variable

IF Statement

Return Value

Create Functions (Table-Valued Function)

Function Name

```
CREATE FUNCTION udf_AverageSalaryByDepartment()
```

```
RETURNS TABLE AS
```

```
RETURN
```

Return Type

No Parameters

```
(
```

```
    SELECT d.[Name] AS Department, AVG(e.Salary) AS AverageSalary
```

```
    FROM Departments AS d
```

```
    JOIN Employees AS e ON d.DepartmentID = e.DepartmentID
```

```
    GROUP BY d.DepartmentID, d.[Name]
```

```
)
```

Return Value

- Functions are called using **schemaName.functionName**

```
SELECT [ProjectID],  
       [StartDate],  
       [EndDate],  
       dbo.udf_ProjectDurationWeeks([StartDate],[EndDate])  
AS ProjectWeeks  
FROM [SoftUni].[dbo].[Projects]
```

Call the Function

ProjectID	StartDate	EndDate	ProjectWeeks
1	2016-09-01	2016-10-07	5
2	2016-10-01	2016-10-07	1
3	2015-10-07	NULL	52

Problem: Salary Level Function

- Write a function **ufn_GetSalaryLevel(@Salary MONEY)** that receives salary of an employee and returns the level of the salary.
 - If salary is < 30000 return "Low"
 - If salary is between 30000 and 50000 (inclusive) returns "Average"
 - If salary is > 50000 return "High"

	FirstName	LastName	Salary	SalaryLevel
1	Guy	Gilbert	12500.00	Low
2	Kevin	Brown	13500.00	Low
3	Roberto	Tamburello	43300.00	Average



Solution: Salary Level Function (1)

Function Name

Input Parameters

```
CREATE FUNCTION
ufn_GetSalaryLevel(@Salary MONEY)
RETURNS NVARCHAR(10)
AS
BEGIN
    -- Function logic here
END;
```

Return Type

Function Body

Solution: Salary Level Function (2)

```
DECLARE @salaryLevel VARCHAR(10)
```

Variable

```
IF (@Salary < 30000)
```

IF Statement

```
    SET @salaryLevel = 'Low'
```

```
ELSE IF (@Salary <= 50000)
```

```
    SET @salaryLevel = 'Average'
```

```
ELSE
```

```
    SET @salaryLevel = 'High'
```

```
RETURN @salaryLevel
```

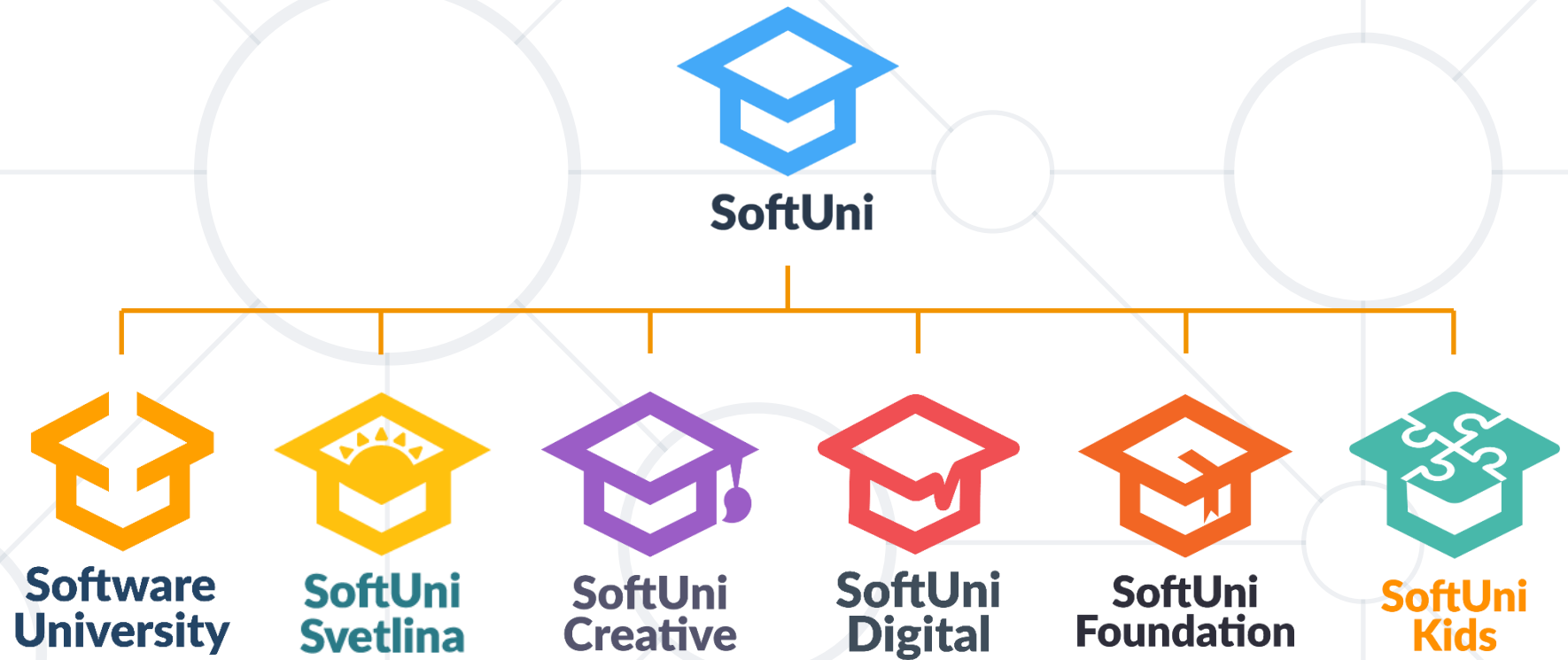
Return Result

- **Functions** allow for complex calculations
 - Usually return a scalar value

```
CREATE FUNCTION f_ProcedureName  
RETURNS ...  
AS  
...
```



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