

## Case Study: Integrating Consumer Data into SMART360

### 1. Data Extraction:

- Develop Python scripts to connect to ABC Utility Company's databases.
- Retrieve consumer data including Consumer ID, Name, Address, Contact Number, Email Address, Account Number, Meter Number, Tariff Plan, Consumption History, and Payment Status.
- Format the extracted data for further processing.

### 2. Data Mapping:

- Map the extracted consumer data to corresponding fields within the SMART360 platform.
- Consumer ID will directly map to Consumer ID in SMART360.
- Name will be split into First Name and Last Name.
- Address will be split into Address Line 1, Address Line 2, City, State, and Zip Code.
- Contact Number will map to Phone Number.
- Email Address will directly map to Email Address.

### 3. Transformation and Loading:

- Transform the extracted data according to the requirements of SMART360.
- Format the address data into separate fields.
- Ensure consistent formatting of names, contact numbers, and email addresses.
- Load the transformed data into the corresponding consumer tables in SMART360.

### 4. Validation and Testing:

- Conduct thorough validation and testing of the integrated consumer data.
- Verify data accuracy, completeness, and consistency.
- Address any discrepancies or issues identified during testing.
- Validate the mapping process by comparing a sample of integrated data with the original source data.

### 5. Deployment:

- Deploy the Python scripts to automate the data integration process.
- Set up scheduled tasks or triggers to execute the scripts at predefined intervals.
- Monitor the automated process for any errors or failures and ensure timely resolution.

## Python Scripts for Automated Mapping

### # Data Extraction Script

```
def extract_data():  
  
    # Connect to ABC Utility Company's databases  
  
    # Retrieve consumer data  
  
    consumer_data = query_consumer_data()  
  
    return consumer_data
```

### **# Data Mapping Script**

```
def map_data(consumer_data):  
    mapped_data = []  
    for consumer in consumer_data:  
        mapped_consumer = {  
            'Consumer ID': consumer['Consumer ID'],  
            'First Name': consumer['Name'].split()[0],  
            'Last Name': consumer['Name'].split()[1],  
            'Address Line 1': consumer['Address'].split(',')[0],  
            'Address Line 2': consumer['Address'].split(',')[1] if len(consumer['Address'].split(',') > 1 else "",  
            'City': consumer['Address'].split(',')[2],  
            'State': consumer['Address'].split(',')[3],  
            'Zip Code': consumer['Address'].split(',')[4],  
            'Phone Number': consumer['Contact Number'],  
            'Email Address': consumer['Email Address']  
        }  
        mapped_data.append(mapped_consumer)  
    return mapped_data
```

### **# Transformation and Loading Script**

```
def transform_and_load(mapped_data):  
    # Transform and load data into SMART360  
    for consumer in mapped_data:  
        load_consumer_data(consumer)
```

### **# Main Script**

```
if __name__ == "__main__":  
    consumer_data = extract_data()  
    mapped_data = map_data(consumer_data)  
    transform_and_load(mapped_data)
```

## **Documentation of Mapping Process :**

### **1. Data Extraction Documentation:**

- Detailed steps to connect to ABC Utility Company's databases.
- Description of the query used to retrieve consumer data.

### **2. Data Mapping Documentation:**

- Explanation of how each consumer data field is mapped to SMART360 fields.
- Handling of edge cases such as missing address components.

### **3. Transformation and Loading Documentation:**

- Description of any data transformations performed before loading into SMART360.
- Explanation of the loading process and any considerations for data consistency.

## **Testing and Validation of Scripts**

### **Unit Testing:**

- Test each function independently to ensure it operates as expected.
- Mock database connections and data to simulate different scenarios.

### **Integration Testing:**

- Test the end-to-end data integration process using sample data.
- Verify that data is accurately mapped and loaded into SMART360.

### **User Acceptance Testing (UAT):**

- Involve stakeholders from ABC Utility Company to validate the integrated data against their expectations.
- Address any feedback or issues identified during UAT.

### **Regression Testing:**

- Repeat testing after any modifications to ensure existing functionality remains intact.