Gurucharan Surianarayanan

Group 117

Metamodel Documentation for Storage Resource Management DSL

Introduction

This metamodel gives a Domain-Specific Language (DSL) that controls cloud storage resources a structured representation. The main objective is to provide standardization and extensibility while streamlining the process of defining, allocating, and overseeing storage resources across various cloud providers.

Components of the Metamodel

1. StorageResource

- **Description:** Represents the main entity in the system, corresponding to a specific cloud storage resource.
- **Attributes:**
  - `name` (EString): A unique identifier for the storage resource.
- **Relationships:**
  - Connected to:
    - **Provider** (1..1): Specifies which cloud provider the resource belongs to.
    - **Region** (1..1): Specifies the geographical location of the resource.
    - **AccessControl** (1..1): Specifies the access level of the resource.

---

2. Provider

- **Description:** Represents the cloud service provider offering the storage resource.

- **Attributes:**
  - `name` (ProviderEnum): Enumerates possible cloud providers. Defaults to `AWS`.
- **ProviderEnum Values:**
  - `AWS`, `Azure`, `GCP`.

---

3. Region

- **Description:** Denotes the geographical region where the storage resource is deployed.
- **Attributes:**
  - `name` (EString): The name of the region (e.g., `us-east-1`, `eu-west-2`).

---

4. AccessControl

- **Description:** Represents the access level of the storage resource, ensuring controlled access based on security requirements.
- **Attributes:**
  - `type` (AccessControlEnum): Enumerates the access control levels. Defaults to `Public`.
- **AccessControlEnum Values:**
  - `Public`: Accessible by everyone.
  - `Private`: Restricted to authorized users only.

Relationships and Cardinality

1. **StorageResource to Provider**:
   - **Cardinality:** (1..1)
   - A storage resource must be associated with exactly one provider.
2. **StorageResource to Region**:
   - **Cardinality:** (1..1)
   - A storage resource must be deployed in exactly one region.
3. **StorageResource to AccessControl**:
   - **Cardinality:** (1..1)
   - A storage resource must have a single access control type defined.

Enums for Standardization

Enums ensure consistency in the metamodel by restricting the allowed values for specific attributes:

1. **ProviderEnum**:
    - Possible values: `AWS`, `Azure`, `GCP`.
    - Purpose: Limits the providers to recognized cloud platforms.
2. **AccessControlEnum**:
    - Possible values: `Public`, `Private`.
    - Purpose: Ensures clarity in access control definitions.

Key Benefits

1. **Clarity and Modularity**:
    - Components such as `Provider`, `Region`, and `AccessControl` are clearly separated, making the model easy to understand and extend.
2. **Standardization**:
    - The use of enumerations reduces ambiguity and ensures consistency across the DSL.
3. **Scalability**:
    - The metamodel can be extended to include additional providers, regions, or access control types with minimal effort.
4. **Real-world Application**:
    - Can be used to create tools for automated provisioning and management of storage resources in a multi-cloud environment.
