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DS220

Data Modeling Use Cases

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Cassandra Use Cases Overview

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Use Case 1: Shopping Cart

Scenario

You are an application developer for a company that is selling online products. Your company has made the decision to migrate its online storefront to a DSE based application. Analyze the conceptual design and application workflow for this exercise and write the CQL to implement the shopping cart and the product catalog.

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Use Case 2: Customer Profile

Scenario

Your company loves the shopping cart design for the online storefront scenario presented in the previous exercise. You now learn from the business that it will be important to store multiple phone numbers, addresses and email addresses for each customer. This data will be read/write intensive and it is important to keep latency to 50ms or less. Also, since passwords will be stored, encryption is mission-critical. Analyze the same conceptual design and application workflow from the previous exercise and write the CQL to implement the customer profile.

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Use Case 3: Sensor Event Tracking

Scenario

You are an application developer in a company that has manufacturing facilities all over the world. Your company makes sensitive, high tech equipment, and each machine used in the manufacturing process contains one or more sensors that captures data such as temperature, speed of a moving part, etc. This data is now going to be stored in a DSE cluster that you must design and maintain. Once the application is up and running, the data it captures will be provided to analytics tool chains.

The application will definitely be write heavy; tens of millions of events will be generated per second, and your company has an SLA requiring that all events be persisted across multiple nodes in your DSE cluster in less than 10ms.

Analyze the conceptual design in the exercise sheet and write the CQL to implement the table(s) needed to store this data.

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Cassandra Use Cases: Possible Solutions

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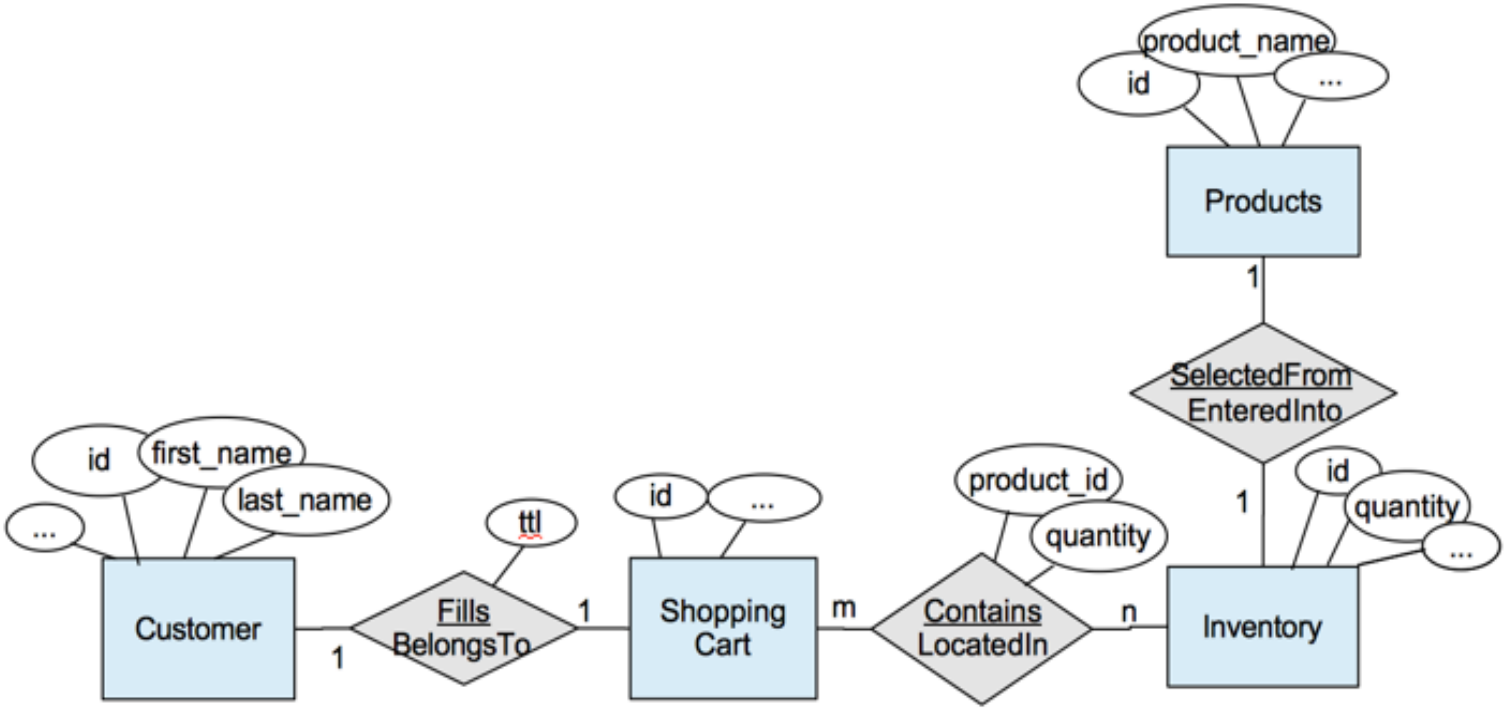
Use Case 1: Shopping Cart

- Customers have a shopping cart and add items to it from a catalog
- Every time a user adds an item to shopping cart or wish list, the item ID is appended to a wide row for that user
  - PK = customerid CK = itemid
- Application Requirements
  - Requires high availability, 24x7x365, no planned downtime, with resilience across multiple datacenters/regions
  - Creation or modification of profiles or in one DC must be visible to all other DC's in less than 500ms
  - Low latency reads and writes to ensure application responsiveness
- Cassandra features
  - Wide rows
  - Single query to produce entire customer cart
  - Replication across regions

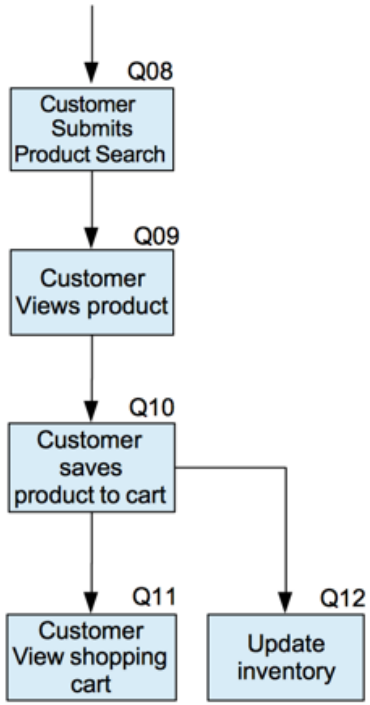
Use Case 1: Shopping Cart

Conceptual Design



Use Case 1: Shopping Cart

Application Workflow



Q08. Retrieve a list of products based on product description

Q09. Retrieve product details based on product id

Q10. Insert item into cart based on the customer id and product id of the product selected.

Q11. Retrieve a list of products in the cart based on the customer id.

Q12. Increment or decrement the quantity of a product in inventory based on specific product id and quantity to increment or decrement.

Use Case 1: Shopping Cart Sample Schema

```
CREATE TABLE shopping_cart (
  customerid text,
  productid text,
  description text,
  time_added timestamp,
  cost double,
  count int,
  total_cost double
  PRIMARY KEY ((userid),productid)
);
```

```
CREATE TABLE product_catalog (
  productid text,
  inventory_count int,
  description text,
  cost double,
  PRIMARY KEY (productid)
);
```

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Use Case 2: Customer Profile

- Store user profile data for the online store front
- This data includes usernames and passwords, Personally Identifiable Information (PII), contact preference, etc.
- This use case is read heavy with latency SLA's of less than 50ms
- Cassandra features
  - User Defined Types
  - Strict Read performance SLA's
  - Encrypted Data

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Use Case 2: Customer Profile Sample Schema

```
CREATE TYPE address (
  Address1 text,
  Address2 text,
  city text,
  state text,
  zip_code text
);

CREATE TYPE phone (
  phone_number text
);

CREATE TYPE email_address (
  email_address text
);
```

```
CREATE TABLE customer (
    customerid text,
    first_name text,
    last_name text,
    addresses map<text, frozen <address>>,
    phone_numbers map<text, frozen <phone>>,
    email_addresses map<text, frozen <email_address>>,
    user_name text,
    pass_word text,
    PRIMARY KEY (customerid)
);
```

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Use Case 3: Sensor Event Tracking

- Events generated by sensor data and make them available to analytics tool chains
- Event sources include
  - Monitoring sensor networks of industrial equipment
- Use case is write heavy
  - Some customers generate tens of million events per second
  - Many customers have hard SLAs requiring that all events be persisted across multiple machines in less than 10ms
- Cassandra Features
  - Time series Data
  - Write heavy SLA's

Use Case 3: Sensor Event Tracking Sample Schema

```
CREATE TABLE sensor_data (
    serial_number text,
    date text,
    snapshot_time timestamp,
    facility_id int,
    sensor_type text,
    sensor_value text,
    PRIMARY KEY ((serial_number, date), snapshot_time)
) ;
```