COSC 416A: Special Topics in Databases... DynamoDB

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What is DynamoDB?

- DynamoDB is a database service offered by Amazon
- It uses Key-Value storage
- It is designed to provide predictable performance and take the hassle out of scaling your database for larger volumes of data.

The back end

- Data is stored on Solid-state drives for low cost and fast performance
- Data is automatically replicated across AWS availability zones
- Scaling is handled automatically You don't have to have the time or expertise to maintain your database when there is a large increase in the number of users

Data representation

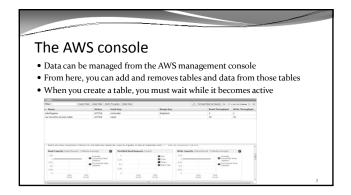
- Attributes are individual pieces of data (ex: name)
- Attributes can have values of numbers, strings, binary, number sets, string sets or binary sets.
- Items are made up of several attributes (ex: name = "Bob", rating = "lame").
- Items must have a primary key.
- Primary keys may consist of a single hash value, or a hash value and a range value.
- Tables are made up of several items.

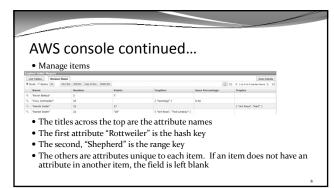
Primary keys

- Primary keys consist of either a hash key, or a hash key AND a range key
- The hash key is used to uniquely identify the item
- The optional range key is used for sorting. For example, a table containing games might have a range key "Release Date" that you could use to sort the games from earliest to latest release date.
- The hash key for two different items can be the same, as can the range key, AS LONG AS they hash key/range key combination is unique

DynamoDB schema

- DynamoDB does not use a schema
- The primary key attributes are the only ones required for a table in DynamoDB. Any other attribute are entirely optional





Querying and adding data without the console

- DynamoDB does not have its own query language (no putty)
- Instead, it supports several different languages including:
- <u>Java</u>
- <u>JavaScript</u>
- Mobile
- <u>PHP</u>
- Python
- Ruby
- Windows & .NET

Creating Table N-Number S-String St String St String tableName = "TableName"; CreateTableRequest createTableRequest = new CreateTableRequest().withTableName(tableName).withKeySchema(new KeySchema(newKeySchemaElement().withAttributeName(AttributeName).withAttribut eType("N")).withProvisionedThroughput(newProvisionedThroughput().withAttribut eType("N")).withWriteCapacityUnits(IL)); waitForTableToBecomeAvailable(tableName);

```
Adding elements to table

String tableName = "TableName";
Map<String, AttributeValue> item = new HashMap<String, AttributeValue>();
item.put("name", new AttributeValue(name));
item.put("year", new AttributeValue().withN(Integer.toString(year)));
item.put("fans", new AttributeValue().withS(fans));
PutItemRequest putItemRequest = new PutItemRequest(tableName, item);
PutItemResult putItemResult = dynamoDB.putItem(putItemRequest);
```

```
Scan item / Scan item with filter

Get items from DB

ScanRequest scanRequest = new ScanRequest(tableName);
ScanResult scanRequest = dynamoDB.scan(scanRequest);

Get item from DB with filter (year > 1985)

HashMaprString, Condition > scanFilter = new HashMaprString, Condition > ();
Condition condition = new Condition()

.withComparisonOperator(ComparisonOperator.GT.toString())

.withAttributeValueList(new AttributeValue().withN("1985"));
scanFilter.put("year", condition);
ScanRequest scanRequest = new

ScanRequest ("year", condition);
ScanResult scanRequest = new

ScanRequest (tableName).withScanFilter(scanFilter);
ScanResult scanResult = dynamoDB.scan(scanRequest);
```

Free Tier

- Because DynamoDB is a service, it costs money
- You have a certain "Free Tier" of 100MB of storage space, 5 writes per second and 10 reads per second
- You must ensure that you do not exceed this free tier to avoid incurring a small charge on your credit card

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Pros and Cons

- ullet The good...
- The fast, predictable performance
- \bullet No need to worry about scaling
- And the bad...
- Cannot do complex queries (No joins, no Group By, no aggregate functions, can't sort on anything apart from the range key)

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Some useful references...

- http://aws.amazon.com/dynamodb/ DynamoDB's homepage
- http://aws.amazon.com/documentation/dynamodb/ documentation
- http://www.youtube.com/watch?v=yqlauXAXISc The first video in a playlist of four about building applications using DynamoDB
- http://www.youtube.com/watch?v=oz-7wJJoHZo An overview of DynamoDB

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