Answer the following questions from the article

"Questions about Primary and Foreign Keys You Were To Shy To Ask"

https://www.red-gate.com/simple-talk/sql/t-sql-programming/questions-about-primary-and-foreign-keys-you-were-too-shy-to-ask

Insert the answers after the questions and turn them in with this file.

**What purpose does the primary key of a table serve?**

A primary key provides a mechanism for ensuring that the rows in a table are unique

**What purpose do primary key values serve?**

The values contained in the column or columns that make up the primary key serve to identify each of those rows

**Can a table have unique values other than the primary key?**

Yes

**Can a primary key column contain NULL values (certification question)?**

No

**What is a composite primary key?**

Where more than one column is used to specify the primary key of a table. Each key, individually cannot uniquely identify each record, but together the combination of all does uniquely identify each record

**What is a clustered index?**

A clustered index is a special type of index that reorders the way records in the table are physically stored

**If a clustered index is already present on the table when the primary key is created, what type of index is created on the primary key?**

Non-Clustered

**A foreign key is a type of ’CONSTRAINT**’ **placed on one or more columns in a table.**

**How does the foreign key enforce referential integrity between tables?**

A Foreign Keys value must reference a valid, existing primary key in the parent table.

**Research: What is the recommended limit of outgoing foreign keys per table?**

A table can reference a maximum of 253 other tables and columns as foreign keys (Outgoing Foreign Key References).

**Research: How many incoming foreign key references can a table support?**

SQL Server 2016 increases the limit for the number of other table and columns that can reference columns in a single table (Incoming Foreign Key References), from 253 to 10,000. However, self referencing FK (where table column is referencing itself in the same table) still is limited to 253 in all the versions of SQL Server.

**A primary key is defined as nullable by default. True or False.**

False

**What is a surrogate key?**

A surrogate key is any column or set of columns that can be declared as the primary key instead of a "real" or natural key, but the keys don’t have a natural relationship with the rest of the columns in a table.

**What is an advantage to using the IDENTITY field as a primary key.**

Advantage of the identity column is that its values are managed by the server and usually cannot be modified.

**What is a GUID?**

A GUID (global unique identifier) is a term for a unique identity.

**How do composite primary keys affect performance?**

Composite keys (multi column primary keys) make any kind of Object/Relational mapping and persistance in general harder.

**What is a natural key?**

Its column value that has a relationship with the rest of the column values in a given data record. Natural keys values: Social Security Number, ISBN, and TaxId

**What are the advantages and disadvantages for natural keys?**

Pros:

* Will require less joins when you only need to return the key value of a foreign key table. This is because the natural key will already be imbedded in your table.
* Easier to search because natural keys have meaning and will be stored in your table. Without the natural key in your table, a search for records based on a natural key would require a join to the foreign key table to get the natural key.

Cons:

* Requires much more work to change a natural key, especially when foreign relationship have been built off the natural key.
* Your primary key index will be larger because natural keys are typically larger in size then surrogate keys.
* Since natural keys are typically larger in size then surrogate keys and are strings instead of integers joins between two tables on a natural key will take more time.

**How do you specify a nonclustered index for the primary key?**

ID INT NOT NULL PRIMARY KEY NONCLUSTERED

**Why is the primary key often matched with the clustered index in a table?**

When you create a PRIMARY KEY constraint, a unique clustered index on the column or columns is automatically created.

**What are the requirements for a foreign key?**

A link must exist between two tables where the column or columns hold a primary key value for one table and is referenced to the column or columns in another table.

**What are the four options that can be set for a foreign key to affect what happens if the parent row is deleted? What do these options do?**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| |  | | --- | | **Specification** | | |  | | --- | | **Update operation on parent table** | | |  | | --- | | **Delete operation on parent table** | |  | |
| **No Action** | |  | | --- | | Not allowed. Error message would be generated. | | |  | | --- | | Not allowed. Error message would be generated. | |
| **Cascade** | |  | | --- | | Associated values in child table would also be updated. | | Associated values in child table would also be Deleted. |
| **SET NULL** | |  | | --- | | Associated values in child table would be set to NULL. Foreign key column should allow NULL values to specify this rule. | | |  | | --- | | Associated values in child table would be set to NULL. Foreign key column should allow NULL values to specify this rule. | |  | |
| **SET Default** | |  | | --- | | Associated values in child table would be set to default value specified in column definition. Also default value should be present in primary key column. Otherwise basic requirement of FK relation would fail and update operation would not be successful. If no default value is provided in foreign key column this rule could not be implemented. | | Associated values in child table would be set to default value specified in column definition. Also default value should be present in primary key column. Otherwise basic requirement of FK relation would fail and delete operation would not be successful. If no default value is provided in foreign key column this rule could not be implemented.   |  | | --- | |  | |

**What two SQL operations use the CASCADE option on the foreign key?**

ON DELETE and ON UPDATE

**Does SQL Server automatically create indexes on foreign keys?**

When you define a foreign key constraint in your database table, an index will not be created automatically on the foreign key columns

**How do you disable and re-enable foreign keys on a table?**

DISABLING: ALTER TABLE table\_name

NOCHECK CONSTRAINT fk\_name;

RE-ABLING: ALTER TABLE table\_name

CHECK CONSTRAINT fk\_name;

**What is the name of the system view used to view information on all primary and foreign keys in the database?**

information\_schema.table\_constraints system view to retrieve the information you need.

SQL Exercise

At the bottom of this file, write a script that does the following in the specified order.

The script must run a single time without error. Use comments and the PRINT statement to

indicate each step in the script.

Create a new database called Homework and run the rest of the commands in that database.

Create the Countries table with the following fields:

CountryID, INT

CountryName, VARCHAR(50) (Indexed)

Population, BIGINT

Currency, VARCHAR(50)

Add CountryID as the primary key and name the key pk\_Country.

Create the Cities table with the following fields:

CityID, INT, PRIMARY KEY

CityName, VARCHAR(50) (Indexed)

CountryID, INT (Indexed)

Population, BIGINT

Specify CityID as the primary key using the simplest syntax available and

let the database give it a name automatically.

Create the Books table with the following fields:

ISBN, VARCHAR(15)

DatePurchased, DATE

Title, VARCHAR(255) (Indexed)

AuthorID, INT (Indexed)

AFTER the CREATE TABLE statement, add a composite, NONclustered primary key to

the table on the ISBN and DatePurchased fields.

Drop the primary key that you added in the last step and use an ALTER TABLE

statement to add the following field to the table:

BookID, INT, PRIMARY KEY

Write a SELECT statement that returns the record for this new primary key

from the sys.key\_constraints view.

Use the ALTER TABLE statement to add a foreign key to Cities that links the CountryID

field in that table to the CountryID field in Countries.

Use the CASCADE option that will delete all cities within a given country when that

country is deleted from the Countries table.

Write statements to insert three records into each of the tables you created above.

Write UPDATE statements to increase the population of each of the countries and

cities you've added by 15%.

USE MASTER;

IF EXISTS (SELECT \* FROM master.dbo.sysdatabases WHERE name = N'HOMEWORK')

BEGIN

DROP DATABASE [HOMEWORK]

END

CREATE DATABASE Homework

GO

USE Homework

GO

PRINT 'Homework Database created'

GO

CREATE TABLE Countries

(

CountryID INT NOT NULL identity(1,1),

CountryName VARCHAR(50),

Population BIGINT,

Currency varchar(50)

CONSTRAINT PK\_COUNTRY PRIMARY KEY(COUNTRYID)

);

PRINT 'Countries Table Created'

CREATE TABLE Cities

(

CityID INT identity(1,1) PRIMARY KEY,

CityName VARCHAR(50),

CountryID INT,

Population BIGINT,

)

Print 'Cities Table Created'

PRINT 'PK\_Country Added'

CREATE TABLE Books

(

ISBN VARCHAR(15) NOT NULL,

DatePurchased DATE ,

Title VARCHAR(255),

AuthorID INT,

CONSTRAINT PK\_\_CompositPKBooks PRIMARY KEY NONCLUSTERED (ISBN, DatePurchased)

)

PRINT 'Books Table Created'

PRINT 'PK\_CompositPKBooks Created'

ALTER TABLE Books

DROP CONSTRAINT[PK\_\_CompositPKBooks]

GO

PRINT 'PK\_CompositPKBooks Dropped'

ALTER TABLE Books

ADD BookID INT PRIMARY KEY

PRINT 'PK\_BooksID Added using Alter Table'

select \* from sys.key\_constraints

go

ALTER TABLE Cities

ADD CONSTRAINT FK\_CitiesCountry

FOREIGN KEY (CountryID)

REFERENCES Countries(CountryID)

ON DELETE CASCADE;

Print 'FK\_CitiesCountry'

--Added Indexes

CREATE INDEX IDX\_CountryName

ON Countries(CountryName)

PRINT 'IDX\_CountryName added'

CREATE INDEX IDX\_CityCountry

ON Cities (CityName, CountryID)

Print 'IDX\_CityCountry added'

CREATE INDEX IDX\_TitleAuthorID

ON Books (Title, AuthorID)

Print 'IDX\_TitleAuthorID added'

USE [Homework]

GO

INSERT INTO [dbo].[Countries]

([CountryName]

,[Population]

,[Currency])

VALUES ('China',1409517397,'Chinese Yuan Renmibi')

,('India',1339180127,'Indian Rupee')

,('United States',324459463, 'US Dollar')

go

INSERT INTO [dbo].[Cities]

([CityName]

,[CountryID]

,[Population])

VALUES

('New York',3, 17800000)

,('Shanghai',1, 10000000)

,('Mumbai',2, 143500000)

GO

INSERT INTO [dbo].[Books]

([ISBN]

,[DatePurchased]

,[Title]

,[AuthorID], [BookID])

VALUES

(9781936876518,'12-19-2017','Shadow Run Fifth Edition', 1,1)

,(9781418479275,'12-19-2017','Flying the Hump to China',2,2)

,(9780872169050,'12-19-2017', 'Horrors',2,3)

GO

Update cities set Population= (Population\*1.15) where CityName = 'New York'

Print 'New York population increased by 15%'

Update cities set Population= (Population\*1.15) where CityName = 'Shanghai'

Print 'Shanghai population increased by 15%'

Update cities set Population= (Population\*1.15) where CityName = 'Mumbai'

Print 'Mumbai population increased by 15%'