- Data Definition Language (DDL)
- Data Control Language (DCL) https://powcoder.com
- In this lecture, we will learn DDL how to add, update, delete data la lobje tv. e Chat powcoder
- And constraints that enforce database integrity

```
create table [table name] (
[attribute definition], ..., [attribute definition],
[printykp efinition] OWCOCET.COM
[candidate key definition], ..., [candidate key definition],
[foreign key definition], ..., [foreign key definition])
```

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# Assignment Project Exam Help where the attribute type can be:

- integer 32bit integer 2147483648 to 2147483647
- · https://powcoder.com
- char(n) where n is an integer of your choice. This defines a string with at most n characters long.
- In this course, we will mostly work with the above types only.

# Assignment Project Exam Help name char(20), deithchar(20), rank char(20), sal integer)

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### Tuple Insertion

insert into [table name] values ([value 1], [value 2],  $\cdots)$ 

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```
insert Into PROF values ('p') 'Adam' ('S') 'asst' (6000')
```

#### 

### Tuple Deletion

delete from T where P

T is a table name

# Assignment for Project Lexennse of Pp

The statement removes all the tuples of T that satisfy P.

Examination of the state of the

PROF						PROF					
$\operatorname{\mathbf{pid}}$	name 1	dept	rank	al	pid	name	$_{ m dept}$	rank	$\mathbf{sal}$		
p1	Adan	CS V	Va. st	6000	<b>p</b> 3	(avw	CE		10000		
p2	Bob	EE	asso	8000	p5 -	Emily	$_{\mathrm{EE}}$	asso	8500		
<i>p</i> 3	Calvin	CS	full	10000							
p4	Dorpthy	EE	asst	5000							
<i>p</i> 5	Emily	EE	asso	8500							

### Tuple Update

update T set A = v where P

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- P is a predicate

The shert D.Sdayes to O.Wes GOO of the Grom that satisfy P.

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update PROF set salary = 6000 where salary = 5000

update PROF set salary = salary \* 1.05 where salary <= 6000



### Updating the Table

Alter: alter a table

ssignment Project Exam Help alter table PROF drop column room;

• https://powcoder.com

drop table PROF;

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delete from PROF:

- Entity Integrity Contraint : Primary key
- · https://powooder.com
- Validation
  - Add WeChat powcoder

- Entity Integrity Contraint : Primary key
- · https://powooder.com
- Validation

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### Entity Integrity Constraint

• No component of the primary key of a base relation is allowed

# ssignment Project Exam Help

- NULL: information is missing for some reasons.
- a base relation/ one which permanently exists in the database.
- a transient relation: temporary results (which is also a relation) of a query.
- PAYOR a ion Wite in the atabas Wite Orden identifiable

(you do not want to be confused with someone else, do you?)

# An attribute (or set of attributes, i.e. composite) K of a relation R1 p SSL Bull Control of the Control of the

- Uniqueness: At any given time, no two rows of R have the specific DOWCOGET.COM
- Minimality: If K is composite, then no component of K can be eliminated without destroying the uniqueness property.

Primary key is chosen from candidate Leys, rest are known as alternate keys.

- Primary Key also automatically adds UNIQUE and NOT MULTO Servel and Odding Condition COM
- Big hint to the DBMS: optimize for searches by this set of a ribular WeChat powcoder

```
primary key([attribute list])
```

```
https://powcoder.com
dept char(20),
rank char(20),
Addin Vere Chat powcoder
)
```

### Candidate Key Definition

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You can define as many candidate keys as you want.

```
pid char(20), name char(20), dept char(20), rank char(20), sal integer, primary key (pid),
unique (hpd), WeChat powcoder
unique (dept, rank)
```

- Entity Integrity Contraint : Primary key
- · https://powcoder.com
- Validation
  - Add WeChat powcoder

#### ta Project Exan n Help PROF p1Adam CS 6000 asst c12011 p2Bob $\overline{\text{EE}}$ 8000 asso 2012 $\overset{\scriptscriptstyle{10000}}{\sim}$ coder.com p3Calvin CS full 2012 $p\overline{4}$ **€**E

#### Natural Join ⋈

A	Į lid	nviive (	ept	nat		W	Cy(a)	ler
	p1	Adam	$^{\mathrm{CS}}$	$\operatorname{asst}$	<b>6</b> 000	c1	2011	
	p2	Bob	EE	asso	8000	c2	2012	
	p1	Adam	CS	asst	6000	c2	2012	

### Delete Problem

What if I delete the first tuple in PROF?

t Project Exam n Help EE asso 8000 c12011  $p\overline{3}$ Calvin CS full 10000 2012 EE5000 p4Dorothy asst 2012 powcoder.com p5

Natural Join ⋈

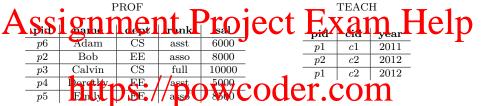
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#### Information Loss

What is p1 in TEACH refers to now?

### **Update Problem**

What if I update the first tuple in PROF?



Natural Join ⋈



#### Information Loss

What is p1 in TEACH refers to now?

# A seferenta hegrin Constraint of CCL Exam Help

- The database must not contain any unmatched foreign key values.
- For every non-null value for a foreign key, there is a matching primary key

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### Foreign Key Definition 1

);

foreign key (attribute list) references tablename (attribute list)

```
The attributes in the attribute list must have the same types as Assegnmenty Properties. X am Help create table prof (
```

```
pid char(20), name char(20), powd coder.com
sal integer, primary key (pid)
);

create tald teach chat powcoder
pid char(20), cid char(20),
year integer, primary key (pid, cid),
foreign key (pid) references prof (pid)
```

The statements in the previous slide

- requires pid be declared either primary key or unique in PROF.
- does not allow the update/deletion of a tuple in PROF if it is referenced by a tuple in TEACH.

# Assignment Project Exam Help

	F	PROF	, ,		4		TEAC	Н
pid	ntt1	a pt	/rank	)WC	od	er <sub>id</sub> (	C <sub>Q</sub> 1	)var
p1	Adam	CS	asst	6000		$\frac{1}{p_1}$	c1	2011
p2	Bob	EE	asso	8000		$\frac{1}{p2}$	c2	2012
p3	Calvin	CS	full	10000		$\overline{p1}$	c3	2012
p4	Derothy	EE	isst	<b>1600</b>	4 40	~		1
p5		CEE V	Vasso	8Ma	ιp	OW	CO	aer

The first two tuples of PROF cannot be deleted.

ERROR 1217 (23000): Cannot delete or update a parent row: a foreign key constraint fails

#### Another example

• employee's DeptNo references to dept table.

```
create table dept (
signment Project Exam Help
   Budget integer not null,
   primary key (DeptNo)
};
      ttps://powcoder.com
   EmpNo integer net null,
   LastName char(20) not null,
   FirstName char(20) not null,
                  Chat powcoder
   MgrNo integer,
   primary key (EmpNo),
   foreign key (DeptNo) references dept (DeptNo)
);
```

DeptNo need not be a primary key in employee

```
LastName char(20) not null,
FirstName char(20) not null,
Dept to the integer of the control of t
```

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Manager is also an employee

### Self Referential Integrity

- employee manager is an employee.
- What about managing director?

# Assignment Project Exam Help

	EmpN	lo		${\bf FirstName}$						MgrNo										
1	4 p5	$\overline{}$	Α	rnc	$\operatorname{ld}$	(H	ea	d (	Οf	Dep	oar	$_{ m tm}$	n	t)		_		NUI	LL	
_n	<sub>J</sub> 2	S	. 7	7		$\mathbf{\pi}$	$\mathbf{S}$	$\theta_{\rm I}$	he	n		X	П		Γ.,	C		) b5	П	
	p 7			٠.				Ğa	iry		Ĭ							$p_5$	)	

Find all who are being supervised.

T1 

Letter (ver) × Va (entropee) 1 at DOWCOCET

 $\Pi_{e1.EmpNo.e1.FirstName.e2.FirstName}(\sigma_{e1.MgrNo=e2.EmpNo}(T1))$ 

	EmpNo	e1.FirstName	e2.FirstName
	p2	Stephen	Arnold (Head Of Department)
ľ	p7	Gary	Arnold (Head Of Department)

### Reaction Policy

• What if we really want to modify a tuple in PROF which is

# Assignment Project Exam Help

Restrict Restrict to the case where there are no such matching entities (alle views) and the views of the vie

Cascades The delete/update operation cascades to delete/update those matching entities.

Nullifies The foreign key is a to inlantall such merching entires and the item is then deleted/updated (should not apply if the foreign key cannot accept nulls in the first place – big problem)

### Foreign Key Definition 2

```
foreign key ([attribute list]) references [table name] on delete cascade

Assignment Project Exam Help
```

```
create table PROF (
pid carrent primary key (pid))

create table PROF (
primary key (pid))
```

```
pide table TEACH (pide that power power primary key (pid, cid),
```

foreign key (pid) references PROF on delete cascade)

### Delete example

foreign key (attribute list) references tablename (attribute list) on delete cascade

PROF the Project Ex Adam CS p1asst 2011 c1EE p2Bob asso 8000 2012  $\overline{\mathrm{CS}}$ 10000p3Calvin full 2012 <del>owc</del>oder.com p4

### No inconsistency

If the first uplow PREF is deleted, sporth first ord hird tuples
 If the first uplow of the first ord hird tuples.

$\mathbf{pid}$	name	dept	rank	sal
p2	Bob	EE	asso	8000
<i>p</i> 3	Calvin	CS	full	10000
p4	Dorothy	EE	asst	5000
$\overline{p5}$	Emily	EE	asso	8500

$\mathbf{pid}$	cid	year
$\overline{p2}$	c2	2012

### Similarly... for update

foreign key (attribute list) references tablename (attribute list) on update cascade

	PROF						TEACH				
A	SiS ]	l Qan I	n <del>e</del> 1	rank	) Fall	iect	E	ka1	$\mathbf{M}_{\mathrm{ar}}$	Help	
	p1	$\mathcal{A}$ dam	CS	asst	6000 ~	•	$\frac{1}{p_1}$	<i>c</i> 1	2011	I	
	p2	Bob	EE	asso	8000		$\frac{1}{p2}$	c2	2012		
	p3	Calvin	CS	full	10000		$\frac{1}{p_1}$	c2	2012		
	p4	Dorothy	EE	asst	5000	2010	40 0	001			
	p5	Enly	SE.	/ass	) AM (	code	T.(	$\mathcal{L}(\mathbf{O})$	Ш		

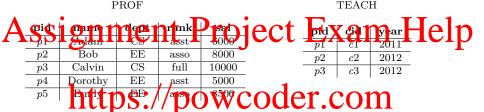
#### No inconsistency

• If the first tuple of PROF is updated, so are the first and third type of TEACHY ECTIEN DOWCOGER

$\mathbf{pid}$	name	$\mathbf{dept}$	rank	sal
p6	Adam	CS	asst	6000
p2	Bob	EE	asso	8000
<i>p</i> 3	Calvin	CS	full	10000
p4	Dorothy	EE	asst	5000
$p_5$	Emily	EE	asso	8500

$\mathbf{pid}$	cid	year
p6	c1	2011
p2	c2	2012
$\overline{p6}$	c2	2012

### Note the asymmetry



- Suppose table R (e.g. TEACH) references table S (PROF).
- You can define "fixes" that propogate changes backwards from GLOR. WE Chat powcoder
- You define them in table R because it is the table that will be affected.
- You cannot define fixes that propogate forward from R to S.

- Entity Integrity Contraint : Primary key
- · https://powooder.com
- Validation

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### Validation

- May involve extra constraints, for examples,
- Supplier numbers must be of the form Snnnn (where ASSISNIMS HOLD TO LOCATE TO PROPERTY OF THE PROPERTY OF THE
  - Supplier status values must be in the range 1-100;
  - Supplier and part cities must be drawn from a certain list;

    Likati Slours pust be disworked Calcertain list;
    - Part weights must be greater than zero;
    - Shipment quantities must be a multiple of 100;

A little supplier silv is bonden, then the status must be 20; implementable but database specific: check trigger

- implementable but database specific: check, trigger, procedure etc.
  - http://www.w3schools.com/sql/sql\_check.asp
  - these commands are beyond the scope of this course

