DBMS Lab 3 (Solutions)

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1.a

- result $\rightarrow \Pi_{PID,PNAME,DID,DNAME} < program * department >$
- select PID, PNAME, DID, DNAME from program as p natural join department as d

1.b

- r1 $\rightarrow$program as p $\bowtie_{p.PID=s.ProgID}$ student as s
  result $\rightarrow \Pi_{r1.StudID,r1.Name}(\sigma_{r1.PNAME='MTech(IT)' \ and \ r1.cpi>6.5}$ r1)
- select StudID, Name from program as p join student as s on p.PID = s.PROGID where p.PNAME = 'MTech(IT)' and s.cpi > 6.5

1.c

- r1 $\rightarrow$program as p $\bowtie_{p.PID=s.ProgID}$ student as s
  result $\rightarrow \Pi_{r1.StudID,r1.Name}(\sigma_{r1.DID='EE' \ or \ r1.DID='IT'}$ r1)
- select StudID, Name from program as p join student as s on p.PID = s.PROGID where p.DID = 'EE' or p.DID = 'IT'

1.d

- r1 $\rightarrow$ $programasp \bowtie_{p.PID=s.ProgID}$ student as s
  result $\rightarrow \sigma_{r1.batch=2012 \ and \ r.PNAME='MSc(IT)'}$ r1
- select * from program as p join student as s on p.PID = s.PROGID where s.batch = '2012' and p.PNAME = 'MSc(IT)'

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2.a

- r1 $\rightarrow (dept\_locations * project)$
  $result \rightarrow \pi_{pname}(\ \sigma_{dlocation='Houston'}$ r1)
- select pname from dept_locations natural join project where dlocation = 'Houston'

2.b

- r1 $\rightarrow$ employee as e1 $\bowtie_{e1.superssn=e2.ssn}$ employee as e2
  result $\rightarrow \sigma_{e1.salary<e2.salary}$ r1
- select * from employee as e1 join employee as e2 on e1.superssn = e2.ssn where e1.salary < e2.salary

2.c

- r1 $\rightarrow \sigma_{dno=1}$ employee * department
  result $\rightarrow r1 \bowtie_{r1.ssn=dependent.essn}$ dependent
- select * from (select * from employee natural join department where dno = 4) as deep join dependent as de on deep.ssn = de.essn

2.d

- r1 $\rightarrow \sigma_{p.name='ProductX'}$ (project as p $\bowtie_{p.dno=w.pno}$ works_on as w)
  r2 $\rightarrow \sigma dno = 5$ employee
  result $\rightarrow \sigma_{r1.hours>2}$ (r1 $\bowtie_{r1.essn=r2.ssn}$ r2)
- select * from (select * from employee as e join works_on as w on e.ssn = w.essn where w.hours > 2) as mix join project as p on mix.pno = p.pno where p.pname = 'ProductX'

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3.a

- result $\rightarrow \sigma_{SalePrice>500\ and\ Category=5}$ Items
- select * from Items where SalePrice > 500 and Category = 5

3.b

- r1 $\rightarrow Sales * salesDetails$
  $result \rightarrow \sigma_{c.Name='Allen'}$ (r1 $\bowtie_{r1.CustomerNo=customer.CustNo}$ customer
- select distinct InvNo from Sales natural join SalesDetails join customer on CustomerNo = CustNo where Name = 'Allen'

3.c

- r1 $\rightarrow \sigma_{InvDate='2011-08-23'}$ (Sales * SalesDetails)
  r2 $\rightarrow r1 \bowtie_{r1.Itemcode=I.Code}$ Item as I
  result $\rightarrow \pi_{r2.Name}$ (r2 $\bowtie_{r2.CustomerNo=c.CustNo}$ customer as c)
- select issd.Name from (select * from (select * from Sales natural join SalesDetails where InvDate = '2011-08-23') as ssd join items on ItemCode = Code) as issd join customer as c on CustomerNo = CustNo where c.Name ='John'

3.d

- r1 $\rightarrow \sigma_{I.category='c1'}$ (Items as I $\bowtie_{I.Code=sd.ItemCode}$ SalesDetails as sd)
  r2 $\rightarrow Sales * r1$
  $result \rightarrow \pi_{c.Name}$ (r2 $\bowtie_{r2.CustomerNo=c.CustNo}$ customer as c))
- select distinct c.Name from (select * from (select * from SalesDetails as sd join items as I on sd.ItemCode= I.code where I.category = 1) as isd natural join sales) as sisd join Customer as c on sisd.CustomerNo = c.CustNo

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4.a

- result $\rightarrow \sigma_{instructorname='PMJat' \text{ and } semester='Winter' \text{ and } acadyear='2010'}$ (instructor * offers * course)
- select * from instructor natural join offers natural join course where instructorname='P M Jat' and semester='Winter' and acadyear='2010'

4.b

- result $\rightarrow \pi_{studentid}$ ($\sigma_{courseno='MT101'}$ registers) $\cup$ $\pi_{studentid}$ ($\sigma_{courseno='MT104'}$ registers)
- select studentid from registers where courseno='MT101' union select studentid from registers where courseno='MT104'

4.c

- result $\rightarrow \pi_{studentid}$ ($\sigma_{courseno='MT101'}$ registers) $-$ $\pi_{studentid}$ ($\sigma_{courseno='MT104'}$ registers)
- select studentid from registers where courseno='MT101' except select studentid from registers where courseno='MT104'

4.d

- result $\rightarrow \pi_{studentid,name,cpi}$ ($\sigma_{courseno='MT101' \text{ and } acadyear='2008'}$ student * registers) $\cap$ $\pi_{studentid,name,cpi}$ ($\sigma_{courseno='MT104' \text{ and } acadyear='2008'}$ student * registers)
- select studentid,name,cpi from student natural join registers where registers.acadyear='2008' AND courseno='MT101' intersect select studentid,name,cpi from student natural join registers where registers.acadyear='2008' AND courseno='MT104'

4.e

- r1 $\rightarrow \pi_{studentid,name,cpi}$ ($\sigma_{(grade='AA' \text{ or } grade='AB') \text{ and } acadyear='2008' \text{ and } semester='Autumn'}$ student * registers)
  r2 $\rightarrow \pi_{studentid,name,cpi}$ ($\sigma_{(grade!='AA' \text{ or } grade!='AB') \text{ and } acadyear='2008' \text{ and } semester='Autumn'}$ student * registers)
  result $\rightarrow$ (r1 - r2)
- select distinct studentid, name, cpi from student as s natural join registers as r where grade in ('AA','AB') and semester='Autumn' and acadyear=2008 except select distinct studentid, name, cpi from student as s natural join registers a r where grade not in ('AA','AB') and semester='Autumn' and acadyear=2008

4.f

- result $\rightarrow \pi_{studentid}$ ($\sigma_{batch=2007 \text{ and } progname='Btech(CS)' \text{and studentid not in } (\pi_{studentid}(\sigma_{spi<6.0})result)}$ student * program)
- select distinct s.studentid from student as s natural join program as p where batch=2007 and progname='Btech(CS)' and s.studentid not in (select studentid from result where spi $<$ 6.0)