# Chương 4, Đại số quan hệ

## Phép toán 1 ngôi

|  | - Biểu diễn các câu lệnh truy vấn sau:  + Tìm các nhân viên làm việc ở phòng số 4:  σMaPB = 4(NHANVIEN)  + Tìm các nhân viên làm việc trong phòng số 4 và có mức lương từ 25.000 → 40.000:  σMaPB = 4 ^ Luong > 25000 ^ Luong < 40000(NHANVIEN)  + Cho biết họ, tên, giới tính và mức lương của các nhân viên:  πHo, Ten, GioiTinh, Luong (NHANVIEN) (Có thể thêm thuộc tính MaNV: πMaNV, Ho, Ten, GioiTinh, Luong (NHANVIEN) - tránh trường hợp 2 người có thông tin giống nhau thì sẽ bị loại bỏ)  + Cho biết họ, tên, giới tính và mức lương của các nhân viên phòng số 5:  πHo, Ten, GioiTinh, Luong (σMaPB = 5(NHANVIEN))  -  + Tìm mã số các nhân viên của phòng số 5 hoặc giám sát trực tiếp các nhân  viên phòng số 5:  A ← σMaPB = 5 (NHANVIEN)  B ← πMaNV (A)  C ← πMaGS (A)  B U C  + Cho biết họ, tên của các nhân viên nữ và tên các thân nhân của họ:  A ← σGioiTinh = “Nu” (NHANVIEN)  B ← ρHoNV, TenNV, MaNV1(πHo, Ten, MaNV(A))  C ← πTen, MaNV(THANHNHAN)  D ← B x C  E ← σMaNV1 = MaNV(D)  F ← πHoNV, TenNV, Ten(E) |
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## Phép toán 2 ngôi

### Phép kết nối

| Cho các quan hệ R1, R2, R3:   | R1   | A | B | C | | --- | --- | --- | | 1 | 2 | 3 | | 4 | 5 | 6 | | 7 | 8 | 9 | | R2   | A | B | C | | --- | --- | --- | | 3 | 1 | 4 | | 1 | 2 | 3 | | 5 | 3 | 1 | | R3   | C | D | E | | --- | --- | --- | | 1 | 4 | 2 | | 3 | 2 | 1 | | 6 | 3 | 4 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |   THực hiện các phép toán sau:  a, R1 \* R3  b, σA>2(R1 \* R3)  c, πBC(R2) \* R3 | a,   | A | B | C | D | E | | --- | --- | --- | --- | --- | | 1 | 2 | 3 | 2 | 1 | | 4 | 5 | 6 | 3 | 4 |   b,   | A | B | C | D | E | | --- | --- | --- | --- | --- | | 4 | 5 | 6 | 3 | 4 |   c,   | πBC(R2) =   | B | C | | --- | --- | | 1 | 4 | | 2 | 3 | | 3 | 1 | | πBC(R2) \* R3 =   | B | C | D | E | | --- | --- | --- | --- | | 2 | 3 | 2 | 1 | | 3 | 1 | 4 | 2 | | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | d, πAC(R1)\*πCD(R3)   |  |  | | --- | --- |   e, σB>2(πBC(R2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

### Phép chia

|  | - Cho biết tên, đại chỉ của các nhân viên của phòng Nghiên cứu  A ← πMaPB(σTenPB = “Nghien cuu”(PHONGBAN))  B ← πMaPB, Ho, Ten, DiaChi(NHANVIEN)  C ← A \* B  D ← πHo, Ten, DiaChi(C)  - Cho biết tên các nhân viên tham gia tất cả các dự án do phòng số 5 điều phối  A ← πMaDA(σPhongQL = 5(DUAN))  B ← πMaNV, MaDA(THAMGIA)  C ← B ÷ A  D ← πHo, Ten(C \* NHANVIEN) |
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## Phép kết nối mở rộng

| | | MaDV | TenDV | | --- | --- | | 1 | DoiNgoai | | 2 | HanhChinh | | 3 | KeToan | | 4 | TaiChinh |   Bảng Đơn vị | | HoTen | MaDV | | --- | --- | | Thanh | 1 | | Hoa | 2 | | Nam | 2 | | Vinh | 1 | | Hung | 5 | | Phuong | Null |   Bảng Nhân viên | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | =   | HoTen | MaDV | TenDV | | --- | --- | --- | | Thanh | 1 | DoiNgoai | | Vinh | 1 | DoiNgoai | | Hoa | 2 | HanhChinh | | Nam | 2 | HanhChinh | | null | 3 | KeToan | | null | 4 | TaiChinh |   =   | MaDV | TenDV | SLNV | | --- | --- | --- | | 1 | DoiNgoai | 2 | | 2 | HanhChinh | 2 | | 3 | KeToan | 0 | | 4 | TaiChinh | 0 | |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

|  | 1, Hãy cho biết mã số, tổng số nhân viên và mức lương trung bình của mỗi phòng ban  2, Với mỗi nhân viên, cho biết họ, tên và tên phòng nếu họ là trưởng phòng  Cách 1, ý 1:    Cách 2, ý 1:    Ý 2: |
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|  | 1,  2,  3, A ← NgayHD = “1/1/2022” (HOADON)  B ← πMaK(A)  C ← πTenK(KHACH \* B)  4, A ← πMaH(Dgia > “200.000”(CHITIETHD))  B ← πMaH, TenH(A \* HANG)  5, A ← πMaK(ngayHD = “2/2/2022”(HOADON))  B ← σDiaChi = “HaiPhong(KHACH)  C ← πMaK, TenK(A \* B)  6, A ← σngayHD = “2/2/2022”(HOADON)  B ← πMaH(A \* CHITIETHD)  C ← πTenH(HANG \* B)  7, A ← πMaH(CHITIETHD)  B ← πMaH(HANG)  C ← B - A  8, A ← πMaK(σNgayHD > 12/12/2021(HOADON))  B ← πMaK(KHACH) - A | 9,  A ← MaHFSUM(SLBan)(CHITIETHOADON)  B ← ρ(MaH, TongSL)(A)  C ← πMaH, TenH, TongSL(B \* HANG)  10,  A ←  B ←  C ← πTenH, MaH, Dgia(B \* HANG)  11,  A ← SoHDFSUM(SLBan \* Dgia)(CHITIETHD)  B ← ρ(SoHD, TongGia) (A)  TongMax ← FMAX(TongGia)(B)  σTongGia = TongMa(B)  12,  A ← MaHFSUM(SLBan)(CHITIETHD)  B ← ρMaH, TongSLBan(A)  TongMax = FMAX(TongSLBan)(B)  C ← ρTongSLBan = TongMax(B)  πMaH, TenH, TongSLBan(C \* HANG) |
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| Viết lệnh SQL để:  + Hiển thị số sinh viên của mỗi lớp  Select Lop.MaLop, TenLop, COUNT(MaSV) As SiSo  From Lop INNER JOIN SINHVIEN  ON Lop.MaLop = SINHVIEN.MaLop  Group By Lop.MaLop, TenLop; | + Cho biết điểm trung bình thi lần 1 các môn học của mỗi sinh viên  Select SINHVIEN.MaSV, HoDem, Ten,  SUM(DIEMLAN1 \* SODVHT) / SUM(SODVHT) As TBL1  From (SINHVIEN INNER JOIN DIEMTHI  ON SINHVIEN.MaSV = DIEMTHI.MaSV)  INNER JOIN MONHOC On DIEMTHI.MAMONHOC = MONHOC.MAMONHOC  Group By SINHVIEN.MaSV, HoDem, Ten; |

# Chương 7, Phụ thuộc hàm

| Ví dụ: Cho F = {AB → E, AG → I, BE → I, E → G, GI → H}. Chứng minh PTH AB → GH suy diễn từ F nhờ luật dẫn Armstrong  + GI → H ⇒ GI → GH (tăng trưởng)  + (AB → E, E → G) ⇒ AB → G (bắc cầu)  + AB → E ⇒ AB → BE (tăng trưởng)  + (AB → BE, BE → I) ⇒ AB → I (bắc cầu)  + (AB → I, AB → G) ⇒ AB → GI (hợp)  + (AB → GI, GI → GH) ⇒ AB → GH (bắc cầu) |  |
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# Chương 8, Phụ thuộc hàm và chuẩn hóa dữ liệu

|  | |  | A | B | C | D | E | F | G | | --- | --- | --- | --- | --- | --- | --- | --- | | R1(AB) | a1 | a2 | b13 | b14 | b15 | b16 | b17 | | R2(ACDE) | a1 | b22 | a3 | a4 | a5 | b26 | b27 | | R3(EFG) | b31 | b32 | b33 | b34 | a5 | a6 | a7 |   A → B  - Ta thấy có 2 hàng (R1, R2) đều có A, ta sẽ chuyển cột B của R2 sang a2   |  | A | B | C | D | E | F | G | | --- | --- | --- | --- | --- | --- | --- | --- | | R1(AB) | a1 | a2 | b13 | b14 | b15 | b16 | b17 | | R2(ACDE) | a1 | a2 | a3 | a4 | a5 | b26 | b27 | | R3(EFG) | b31 | b32 | b33 | b34 | a5 | a6 | a7 |   ACD → E  - Ta thấy có mỗi R2 có (ACD) → không làm gì  EF → G  - Ta thấy có mỗi R3 có (EF) → không làm gì  - Sau cùng ta thấy không có hàng nào có đầy đủ thuộc tính (ai) → bị mất mát dữ liệu |
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