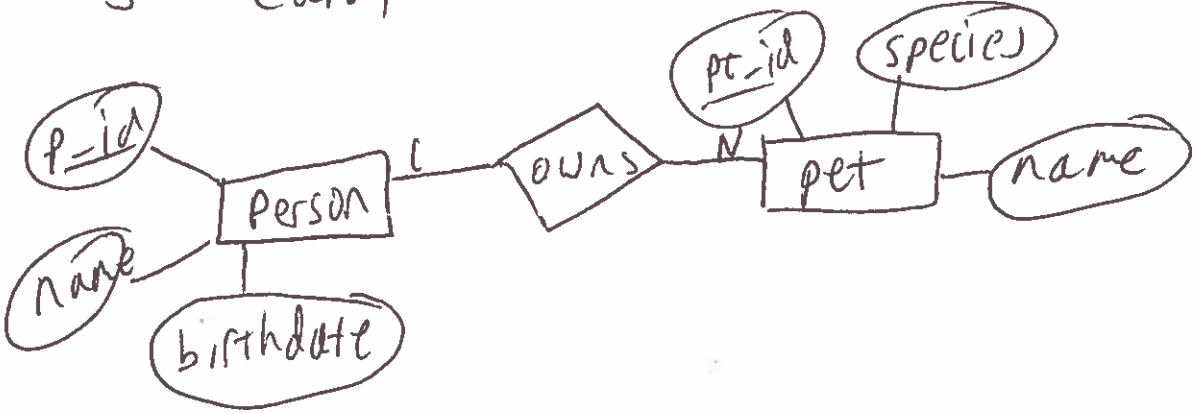
Person : (p_id, name, birthdate)

| | | |
|---|---|---|
| 4 | Bob | 1967-10-13 |
| 1 | Alice | 1970-1-1 |
| 2 | Bob | 1900-1-1 |
| 3 | Carol | 1982-2-28 |




pet: (pt_id, species, name, owner)
└ Foreign key

| | | | |
|---|---|---|---|
| 1 | Rabbit | Binky | 1 |
| 2 | Dog | Sparky | 3 |
| 3 | Cat | Kirby | 3 |

# Relational Algebra (or Calculus)

Project - selects attributes

$\pi_{a_1, a_2}(R)$ - output is a relation - no duplicates

~~Test~~ $\pi_{name}(Person) = \{Alice, Bob, Carol\}$

Select - selects elements / rows

$\sigma_{a_1 = v_1}(R)$

$\sigma_{name = 'Bob'}(Person) = \{(2, Bob, 1900\text{-}1\text{-}1), (4, Bob, 1967\text{-}10\text{-}13)\}$

Cartesian Product - combines two relations

$R_1 \times R_2$ ~~Person × Pet~~

$Person \times \rho_{pet\text{-}name/name}(Pet)$

| p_id | name | birthdate | pt_id | species |
|---|---|---|---|---|

Rename $\rho_{a'/a}(R)$ - rename a to a'

Natural Join

$R_1 \bowtie R_2 \equiv R_1 \times R_2$, with matching attributes matched

If $R_1, R_2$ have common $a_1, a_2, \ldots, a_n$

$R_1 \bowtie R_2 = \pi_{r/a:a', \ldots, a_n)}(\sigma_{a_1 = a'_1, a_2 = a'_2, \ldots, a_n = a'_n})(R_1 \times \rho_{a'_1/a_1, a'_2/a_2, \ldots, a'_n/a_n}(R_2))$

Person × $\rho_{pet\_name/name}$(Pet)

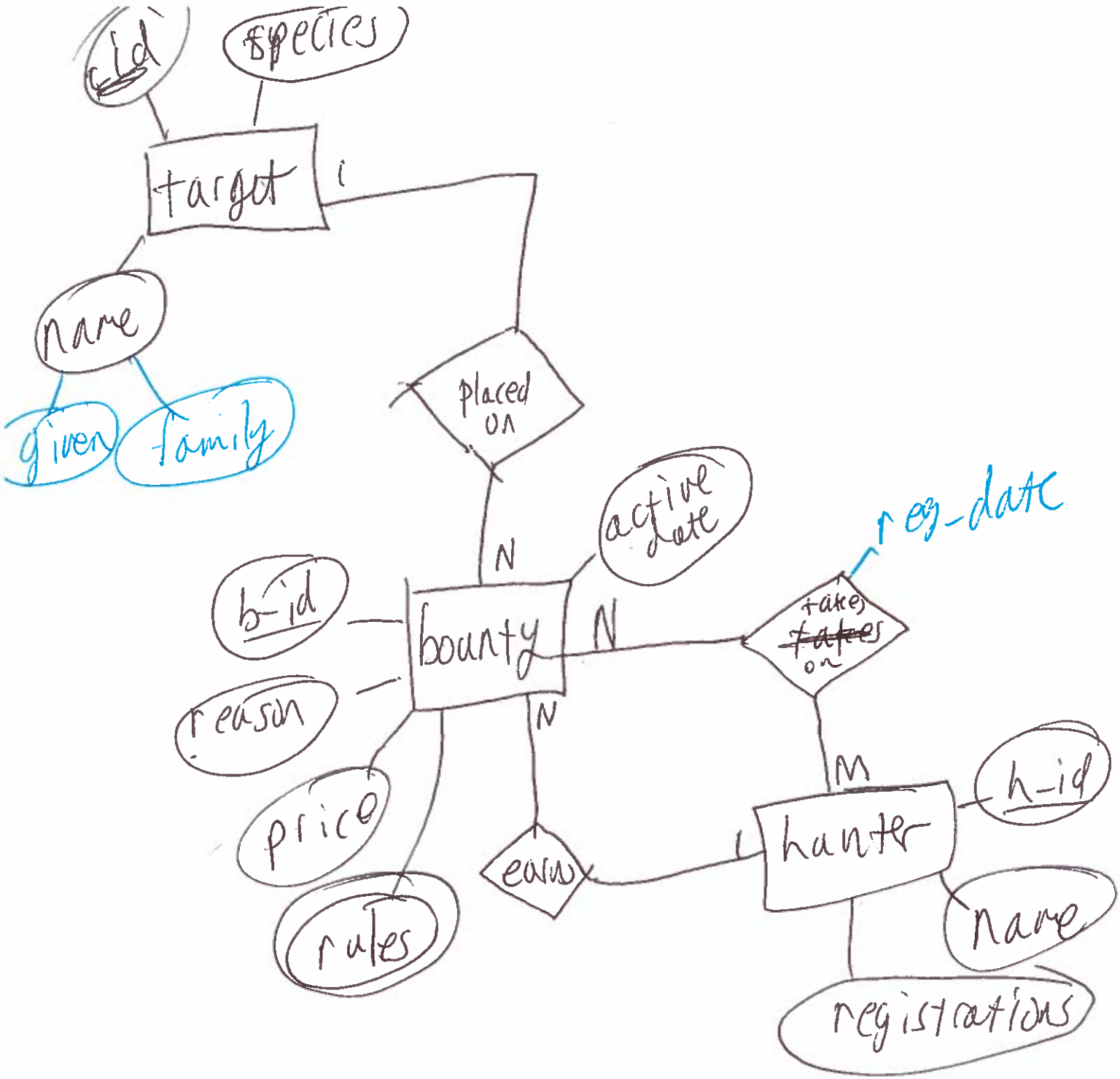
| p_id | name | birthdate | pt_id | pet_name | species | owner |
|---|---|---|---|---|---|---|
| 1 | Alice | 1970-1-1 | 1 | Binky | Rabbit | 1 |
| 1 | Alice | 1970-1-1 | 2 | Sparky | Dog | 3 |
| 1 | Alice | 1970-1-1 | 3 | Kirby | Cat | 3 |
| 2 | Bob | 1900-1-1 | 1 | Binky | Rabbit | 1 |

. . . 8 more . . .

$\pi_{name, pet\_name}(\sigma_{p\_id=owner}(Person \times \rho_{pet\_name}(Pet)))$

| name | pet_name |
|---|---|
| Alice | Binky |
| Carol | Sparky |
| Carol | Kirby |

$\pi_{name, pet\_name}(Person \bowtie \rho_{pet\_name/name, p\_id/owner}(Pet))$


id
species
target
1
name
given
family
placed on
N
active date
b-id
bounty
N
reason
N
price
rules
earn
take/takes on
reg_date
M
hunter
h-id
name
registrations

Target

| t_id | species | name |
|---|---|---|
| 52871 | Android | Cindi Mayweather |
| 7324 | Human | Han Solo |

~~Bounty~~
~~b_id~~

Bounty

| b_id | ~~target_id~~ | reason | price | active_date | earner |
|---|---|---|---|---|---|
| 1 | 52871 | tell in love w/ human | $1M | Jan 7, 5392 | ¢ |

bounty_rule

| b_id | rule_no | rule |
|---|---|---|
| 1 | 1 | no phasers |

hunter

| h_id | name | registration |
|---|---|---|
| 73 | Hk-47 | 273628 |

hunter_active_bounty (join relation)

| h_id | b_id | reg_date |
|---|---|---|
| 73 | 1 | Jan 10, 5392 |

Entity → relation

attribute → attribute

MV attr → relation w/ FK referencing entity

1:1, 1:M relationship → foreign key on M side (1:M) either for 1:1

M:N relationship → join relation

rel w/ attributes → go w/ FK, or make join relation