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Comp 420

The Domain

- Pokedex: A digital encyclopedia designed to give information about the Pokemon in the world contained in its database
- Pokemon data is interesting and has a flexible level of complexity
- Pokemon community is very robust (PokeAPI, Veekun, online Pokedexes, random excel spreadsheets posted to forums)
- Each Pokemon game has a unique Pokedex with its own variants.
- We stuck with the National Pokedex to keep the database focussed.
- Business needs? Hobbyists, competitive players, people who want to know details about specific Pokemon

What does a Pokedex tell you?

Pokédex data

National №	004
Type	FIRE
Species	Lizard Pokémon
Height	2'0" (0.61m)
Weight	18.7 lbs (8.5 kg)
Abilities	Blaze Solar Power (hidden ability)
Local №	004 (Red,Blue,Yellow,FireRed,LeafGreen) 229 (Gold,Silver,Crystal) 234 (HeartGold,SoulSilver) 083 (X,Y)
Japanese	Hitokage

Base stats

HP	39		188	282
Attack	52		98	223
Defense	43		81	203
Sp. Atk	60		112	240
Sp. Def	50		94	218
Speed	65		121	251

Lv.	Move	Type	Cat.	Power	Acc.
1	Growl	NORMAL		-	100
1	Scratch	NORMAL		40	100
7	Ember	FIRE		40	100
10	Smokescreen	NORMAL		-	100
16	Dragon Rage	DRAGON		-	100
19	Scary Face	NORMAL		-	100
25	Fire Fang	FIRE		65	95
28	Flame Burst	FIRE		70	100
34	Slash	NORMAL		70	100
37	Flamethrower	FIRE		90	100
43	Fire Spin	FIRE		35	85
46	Inferno	FIRE		100	50

Evolution chart

#004
Charmander
Fire

→ (Level 16)

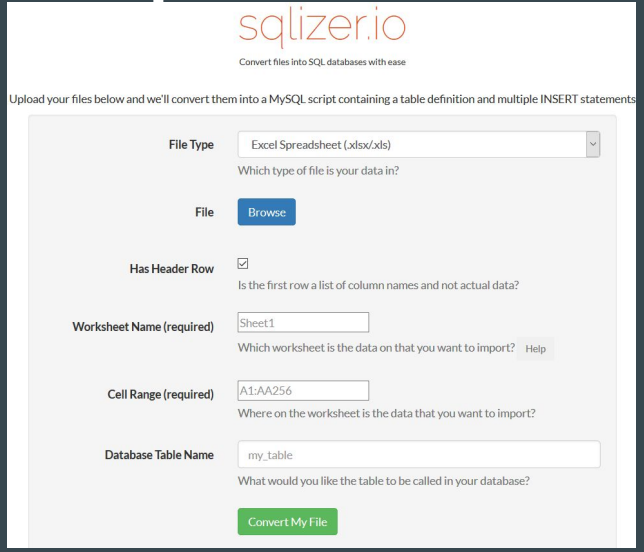
#005
Charmeleon
Fire

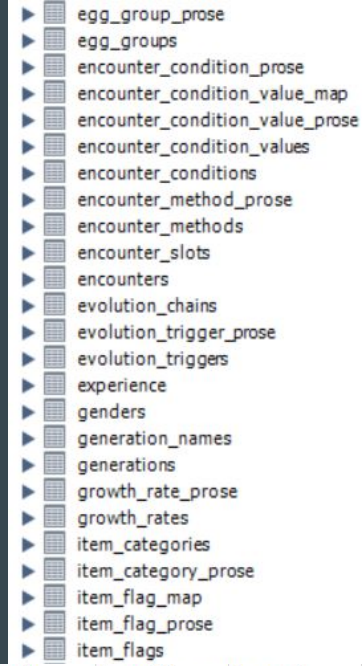
→ (Level 36)

#006
Charizard
Fire, Flying

The Data Pipeline

- To form the base: Veekun data (Pokemon table)
- To fill in the gaps: Excel spreadsheets created by the Pokemon community passed through SQLizer.io
- Data sources were fairly polished with minimal cleanup required
- PokeAPI was nice, but the other data sources were sufficient to form our database





Pok_id	Pok_name	b_hp	b_atk	b_def	b_sp_atk	b_sp_def	b_speed
#001	Bulbasaur	45	49	49	65	65	45
#002	Ivysaur	60	62	63	80	80	60
#003	Venusaur	80	82	83	100	100	80
#003	Venusaur	80	100	123	122	120	80
#004	Charmander	39	52	43	60	50	65
#005	Charmeleon	58	64	58	80	65	80
#006	Charizard	78	84	78	109	85	100
#006	Charizard	78	130	111	130	85	100
#006	Charizard	78	104	78	159	115	100
#007	Squirtle	44	48	65	50	64	43
#008	Wartortle	59	63	80	65	80	58
#009	Blastoise	79	83	100	85	105	78
#009	Blastoise	79	103	120	135	115	78
#010	Caterpie	45	30	35	20	20	45

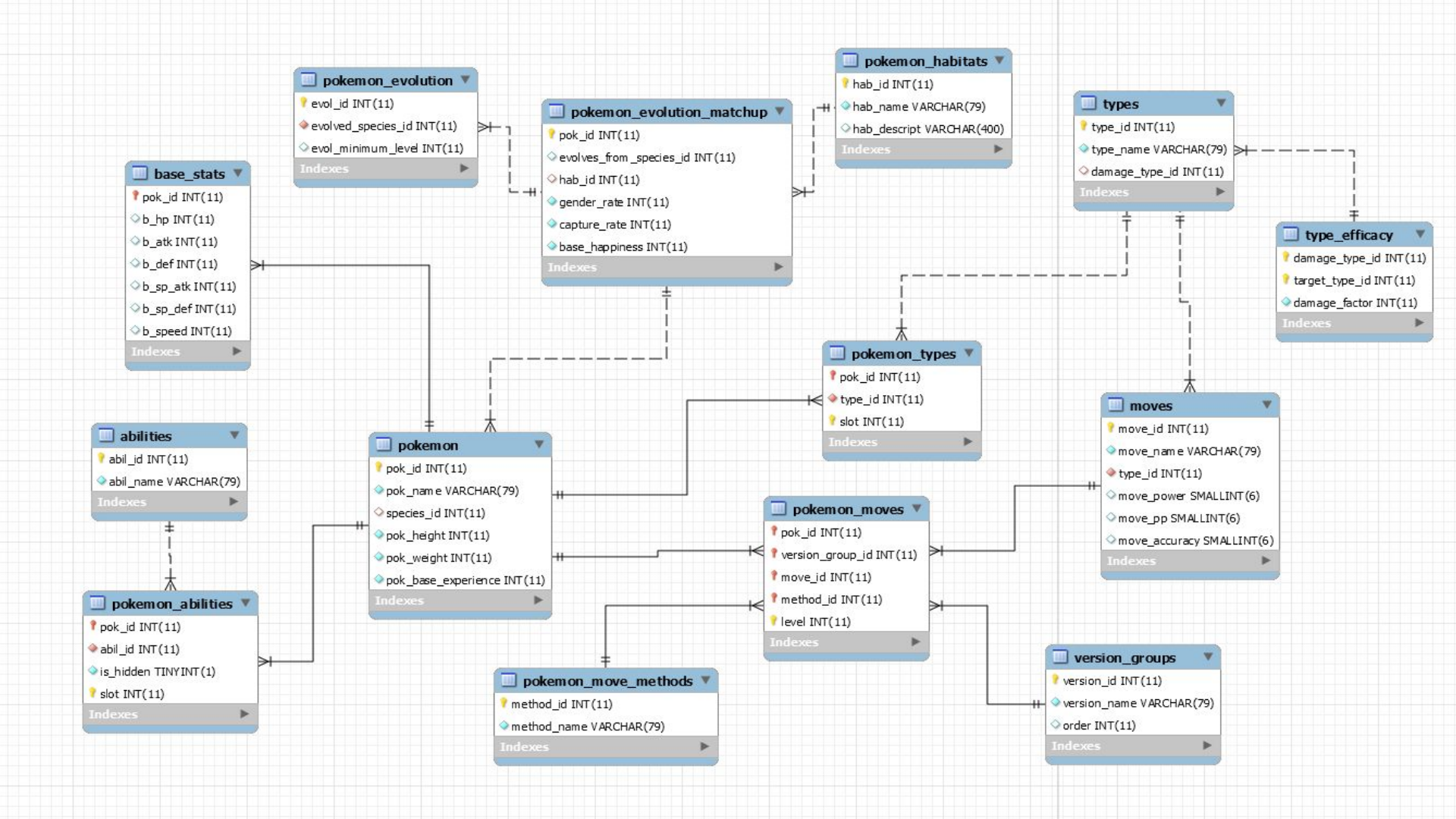
PokeAPI Example for Bulbasaur

http://pokeapi.co/api/v2/ pokemon/1/ submit

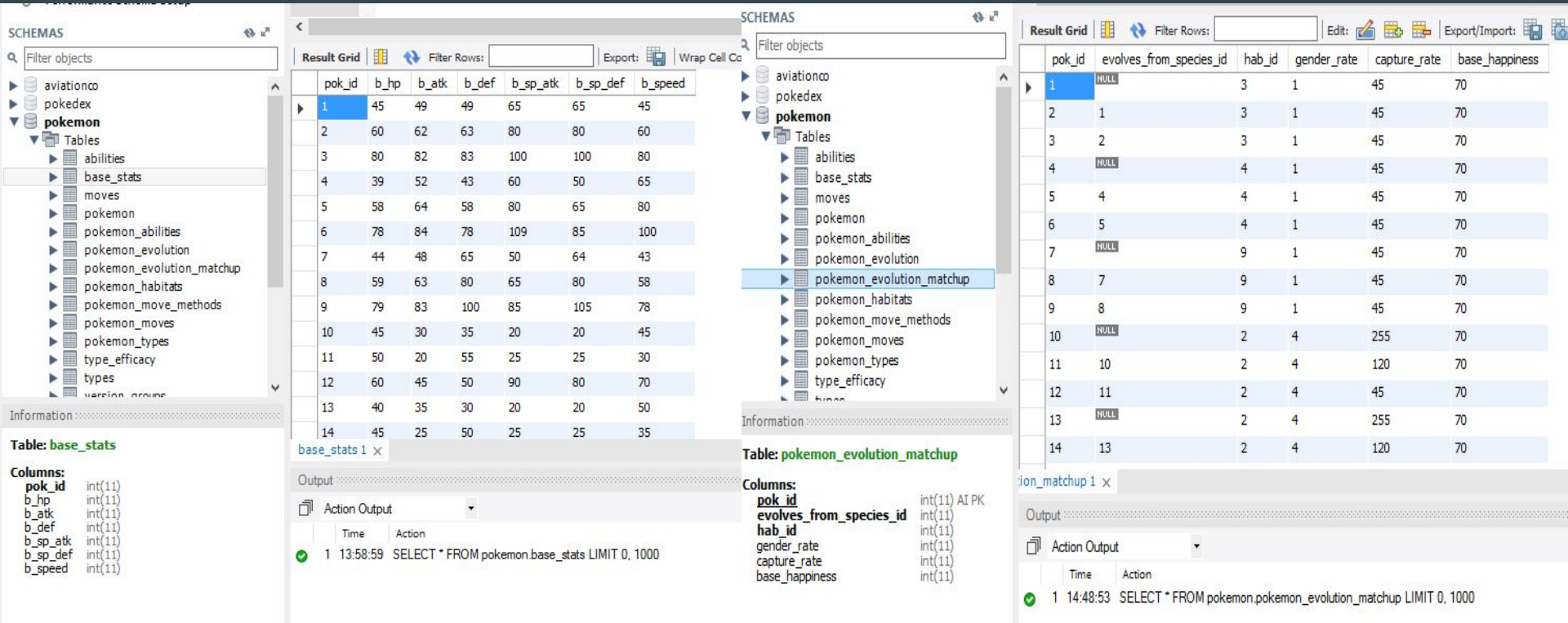
Need a hint? try *pokemon/1/* or *type/3/* or *ability/4/*

Resource for bulbasaur

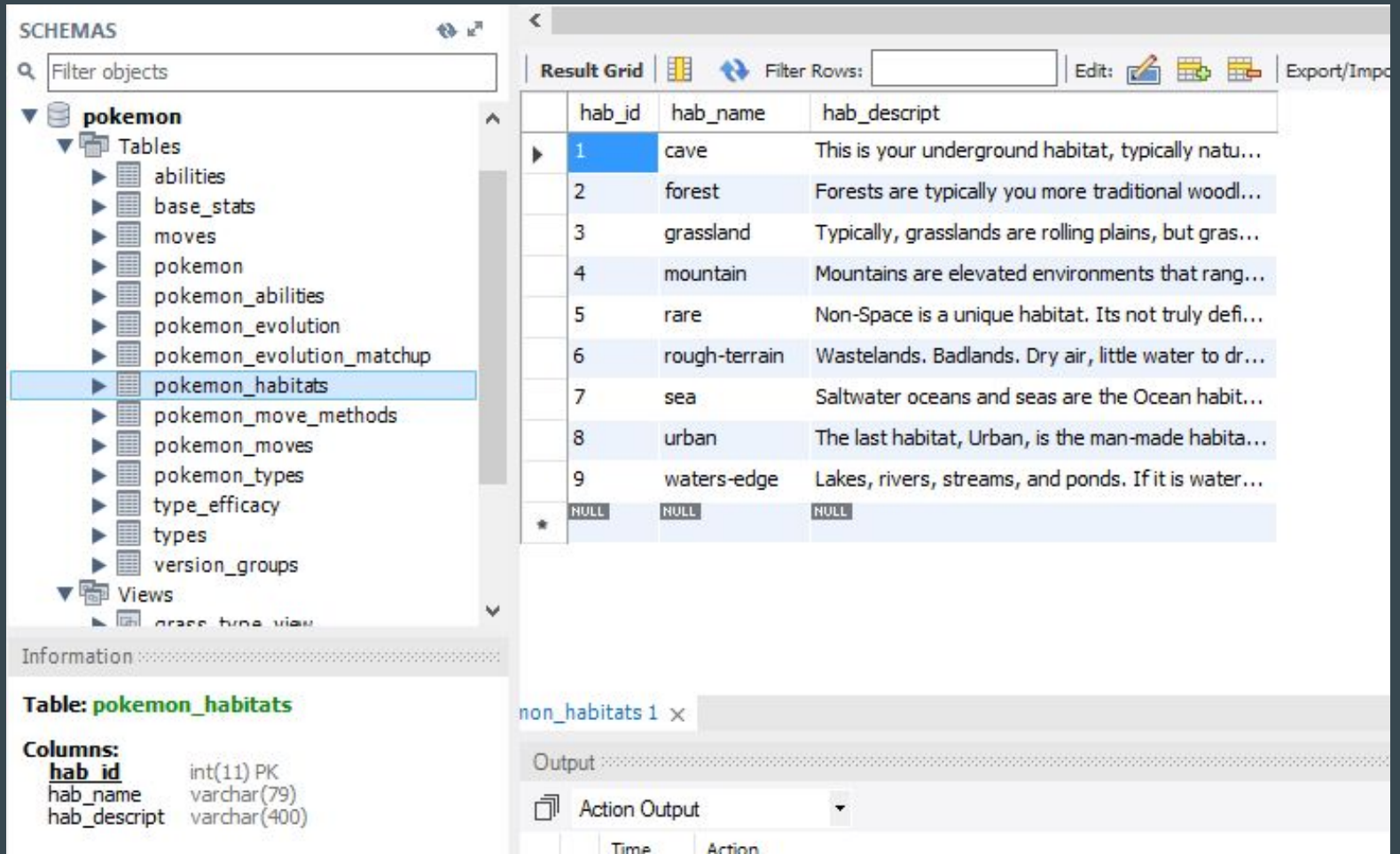

```
{
        "id": 1,
        "name": "bulbasaur",
        "base_experience": 64,
        "height": 7,
        "is_default": true,
        "order": 1,
        "weight": 69,
        "abilities": [
                {
                        "is_hidden": true,
                        "slot": 3,
                        "ability": {
                                "name": "chlorophyll",
                                "url": "http://pokeapi.co/api/v2/ability/34/"
                        }
                },
                {
```

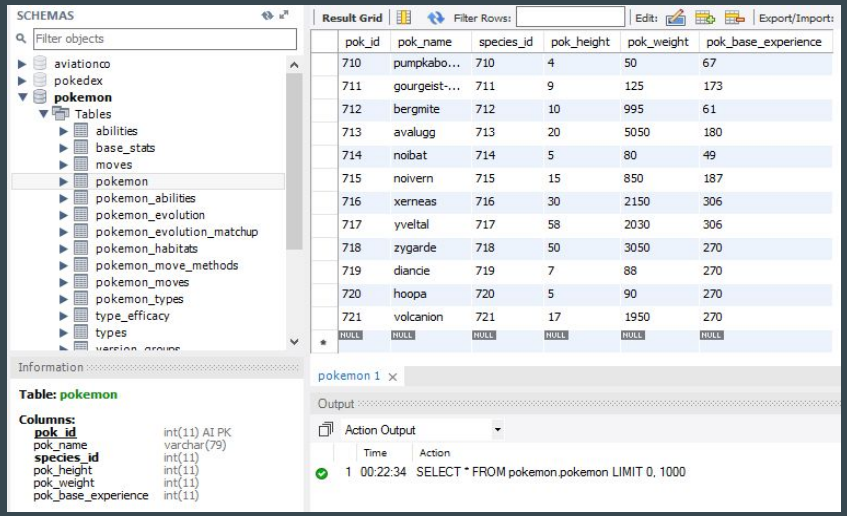

pokemon_evolution
evol_id INT(11)
evolved_species_id INT(11)
evol_minimum_level INT(11)
Indexes
pokemon_habitats
hab_id INT(11)
hab_name VARCHAR(79)
hab_descript VARCHAR(400)
Indexes
pokemon_evolution_matchup
pok_id INT(11)
evolves_from_species_id INT(11)
hab_id INT(11)
gender_rate INT(11)
capture_rate INT(11)
base_happiness INT(11)
Indexes
types
type_id INT(11)
type_name VARCHAR(79)
damage_type_id INT(11)
Indexes
base_stats
pok_id INT(11)
b_hp INT(11)
b_atk INT(11)
b_def INT(11)
b_sp_atk INT(11)
b_sp_def INT(11)
b_speed INT(11)
Indexes
type_efficacy
damage_type_id INT(11)
target_type_id INT(11)
damage_factor INT(11)
Indexes
pokemon_types
pok_id INT(11)
type_id INT(11)
slot INT(11)
Indexes
abilities
abil_id INT(11)
abil_name VARCHAR(79)
Indexes
pokemon
pok_id INT(11)
pok_name VARCHAR(79)
species_id INT(11)
pok_height INT(11)
pok_weight INT(11)
pok_base_experience INT(11)
Indexes
moves
move_id INT(11)
move_name VARCHAR(79)
type_id INT(11)
move_power SMALLINT(6)
move_pp SMALLINT(6)
move_accuracy SMALLINT(6)
Indexes
pokemon_moves
pok_id INT(11)
version_group_id INT(11)
move_id INT(11)
method_id INT(11)
level INT(11)
Indexes
pokemon_abilities
pok_id INT(11)
abil_id INT(11)
is_hidden TINYINT(1)
slot INT(11)
Indexes
pokemon_move_methods
method_id INT(11)
method_name VARCHAR(79)
Indexes
version_groups
version_id INT(11)
version_name VARCHAR(79)
order INT(11)
Indexes

The Tables


SCHEMAS
Filter objects
aviationco
pokedex
pokemon
Tables
abilities
base_stats
moves
pokemon
pokemon_abilities
pokemon_evolution
pokemon_evolution_matchup
pokemon_habitats
pokemon_move_methods
pokemon_moves
pokemon_types
type_efficacy
types
Result Grid
Filter Rows:
Export:
Wrap Cell Co
pok_id b_hp b_atk b_def b_sp_atk b_sp_def b_speed
1 45 49 49 65 65 45
2 60 62 63 80 80 60
3 80 82 83 100 100 80
4 39 52 43 60 50 65
5 58 64 58 80 65 80
6 78 84 78 109 85 100
7 44 48 65 50 64 43
8 59 63 80 65 80 58
9 79 83 100 85 105 78
10 45 30 35 20 20 45
11 50 20 55 25 25 30
12 60 45 50 90 80 70
13 40 35 30 20 20 50
14 45 25 50 25 25 35
Information
Table: base_stats
Columns:
pok_id int(11)
b_hp int(11)
b_atk int(11)
b_def int(11)
b_sp_atk int(11)
b_sp_def int(11)
b_speed int(11)
base_stats 1
Output
Action Output
Time Action
1 13:58:59 SELECT * FROM pokemon.base_stats LIMIT 0, 1000
SCHEMAS
Filter objects
aviationco
pokedex
pokemon
Tables
abilities
base_stats
moves
pokemon
pokemon_abilities
pokemon_evolution
pokemon_evolution_matchup
pokemon_habitats
pokemon_move_methods
pokemon_moves
pokemon_types
type_efficacy
Information
Table: pokemon_evolution_matchup
Columns:
pok_id int(11) AI PK
evolves_from_species_id int(11)
hab_id int(11)
gender_rate int(11)
capture_rate int(11)
base_happiness int(11)
Result Grid
Filter Rows:
Edit:
Export/Import:
pok_id evolves_from_species_id hab_id gender_rate capture_rate base_happiness
1 NULL 3 1 45 70
2 1 3 1 45 70
3 2 3 1 45 70
4 NULL 4 1 45 70
5 4 4 1 45 70
6 5 4 1 45 70
7 NULL 9 1 45 70
8 7 9 1 45 70
9 8 9 1 45 70
10 NULL 2 4 255 70
11 10 2 4 120 70
12 11 2 4 45 70
13 NULL 2 4 255 70
14 13 2 4 120 70
ion_matchup 1
Output
Action Output
Time Action
1 14:48:53 SELECT * FROM pokemon.pokemon_evolution_matchup LIMIT 0, 1000

The Tables (cont.)




SCHEMAS
Filter objects
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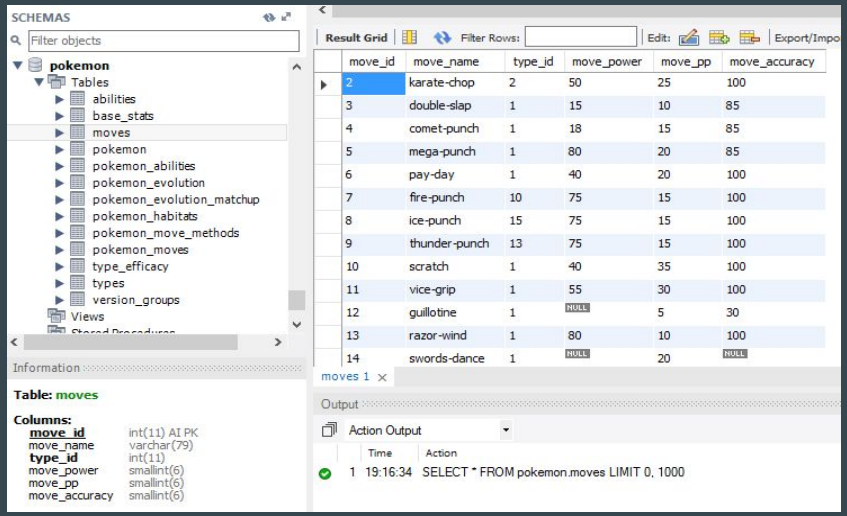
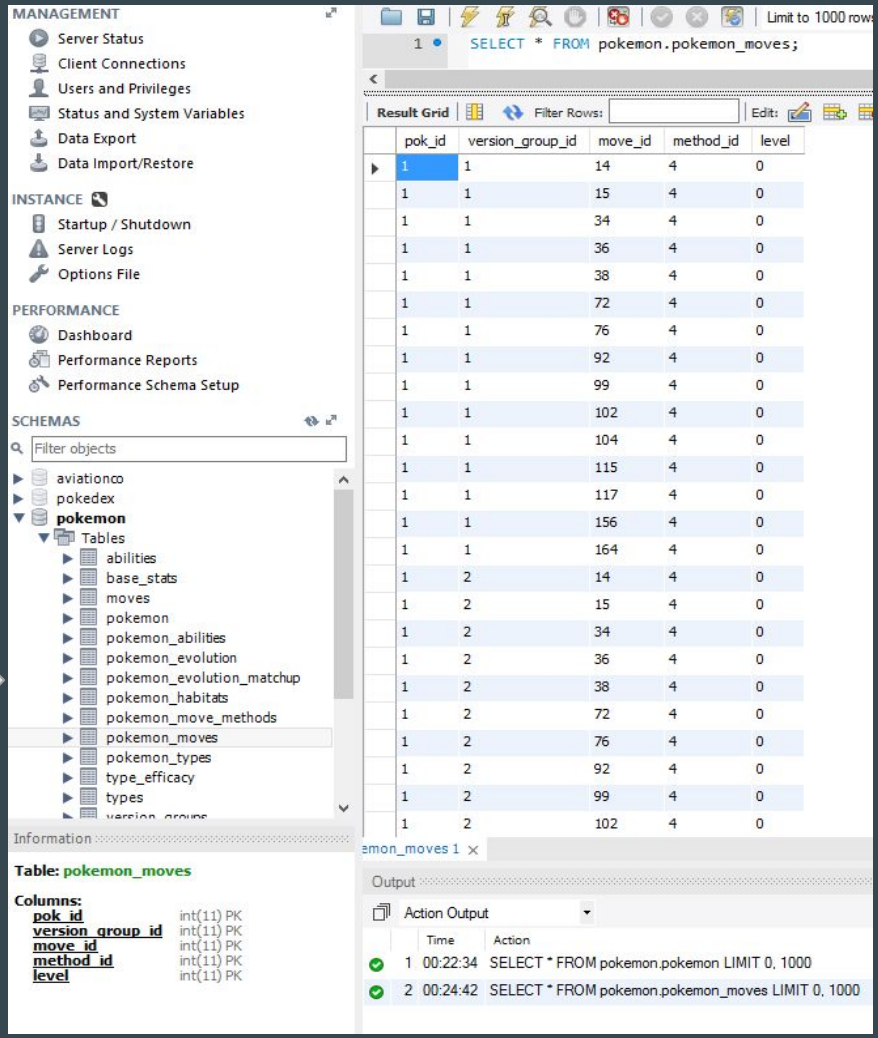
pokedex
pokemon
Tables
abilities
base_stats
moves
pokemon
pokemon_abilities
pokemon_evolution
pokemon_evolution_matchup
pokemon_habitats
pokemon_move_methods
pokemon_moves
pokemon_types
type_efficacy
types
Information
Table: pokemon
Columns:
pok_id int(11) AI PK
pok_name varchar(79)
species_id int(11)
pok_height int(11)
pok_weight int(11)
pok_base_experience int(11)
Result Grid
Filter Rows:
Edit:
Export/Import:
pok_id pok_name species_id pok_height pok_weight pok_base_experience
710 pumpkabo... 710 4 50 67
711 gourgeist-... 711 9 125 173
712 bergmite 712 10 995 61
713 avalugg 713 20 5050 180
714 noibat 714 5 80 49
715 noivern 715 15 850 187
716 xerneas 716 30 2150 306
717 yveltal 717 58 2030 306
718 zygarde 718 50 3050 270
719 diancie 719 7 88 270
720 hoopa 720 5 90 270
721 volcanion 721 17 1950 270
pokemon 1
Output
Action Output
Time Action
1 00:22:34 SELECT * FROM pokemon.pokemon LIMIT 0, 1000

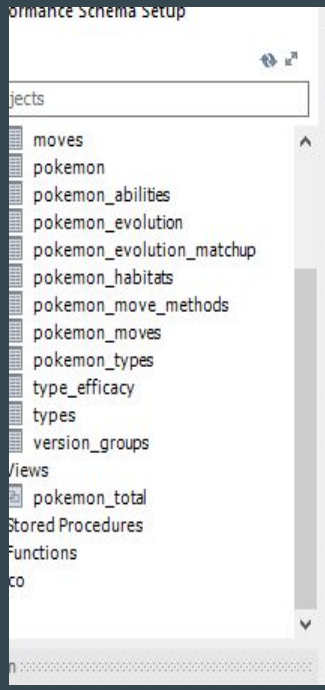

SCHEMAS
Filter objects
pokemon
Tables
abilities
base_stats
moves
pokemon
pokemon_abilities
pokemon_evolution
pokemon_evolution_matchup
pokemon_habitats
pokemon_move_methods
pokemon_moves
type_efficacy
types
version_groups
Views
Information
Table: moves
Columns:
move_id int(11) AI PK
move_name varchar(79)
type_id int(11)
move_power smallint(6)
move_pp smallint(6)
move_accuracy smallint(6)
Result Grid
Filter Rows:
Edit:
Export/Impo
move_id move_name type_id move_power move_pp move_accuracy
2 karate-chop 2 50 25 100
3 double-slap 1 15 10 85
4 comet-punch 1 18 15 85
5 mega-punch 1 80 20 85
6 pay-day 1 40 20 100
7 fire-punch 10 75 15 100
8 ice-punch 15 75 15 100
9 thunder-punch 13 75 15 100
10 scratch 1 40 35 100
11 vice-grip 1 55 30 100
12 guillotine 1 5 30
13 razor-wind 1 80 10 100
14 swords-dance 1 20
moves 1
Output
Action Output
Time Action
1 19:16:34 SELECT * FROM pokemon.moves LIMIT 0, 1000


MANAGEMENT
Server Status
Client Connections
Users and Privileges
Status and System Variables
Data Export
Data Import/Restore
INSTANCE
Startup / Shutdown
Server Logs
Options File
PERFORMANCE
Dashboard
Performance Reports
Performance Schema Setup
SCHEMAS
Filter objects
aviationco
pokedex
pokemon
Tables
abilities
base_stats
moves
pokemon
pokemon_abilities
pokemon_evolution
pokemon_evolution_matchup
pokemon_habitats
pokemon_move_methods
pokemon_moves
pokemon_types
type_efficacy
types
Information
Table: pokemon_moves
Columns:
pok_id int(11) PK
version_group_id int(11) PK
move_id int(11) PK
method_id int(11) PK
level int(11) PK
Limit to 1000 rows
1 SELECT * FROM pokemon.pokemon_moves;
Result Grid
Filter Rows:
Edit:
pok_id version_group_id move_id method_id level
1 1 14 4 0
1 1 15 4 0
1 1 34 4 0
1 1 36 4 0
1 1 38 4 0
1 1 72 4 0
1 1 76 4 0
1 1 92 4 0
1 1 99 4 0
1 1 102 4 0
1 1 104 4 0
1 1 115 4 0
1 1 117 4 0
1 1 156 4 0
1 1 164 4 0
1 2 14 4 0
1 2 15 4 0
1 2 34 4 0
1 2 36 4 0
1 2 38 4 0
1 2 72 4 0
1 2 76 4 0
1 2 92 4 0
1 2 99 4 0
1 2 102 4 0
emon_moves 1
Output
Action Output
Time Action
1 00:22:34 SELECT * FROM pokemon.pokemon LIMIT 0, 1000
2 00:24:42 SELECT * FROM pokemon.pokemon_moves LIMIT 0, 1000

A sampling of our DML

Calculate totals for base stats

```
create view pokemon_total as
SELECT pokemon.pok_id, pokemon.pok_name, base_stats.b_atk, base_stats.b_def, base_stats.b_hp,
base_stats.b_speed, base_stats.b_sp_atk, base_stats.b_sp_def,
sum(base_stats.b_atk + base_stats.b_def + base_stats.b_hp + base_stats.b_speed + base_stats.b_sp_atk + base_stats.b_sp_def) total
FROM pokemon
INNER JOIN base_stats
ON pokemon.pok_id = base_stats.pok_id
GROUP BY pokemon.pok_id;
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

pok_id	pok_name	b_atk	b_def	b_hp	b_speed	b_sp_atk	b_sp_def	total
1	bulbasaur	49	49	45	45	65	65	318
2	ivysaur	62	63	60	60	80	80	405
3	venusaur	82	83	80	80	100	100	525
4	charmander	52	43	39	65	60	50	309
5	charmeleon	64	58	58	80	80	65	405
6	charizard	84	78	78	100	109	85	534
7	squirtle	48	65	44	43	50	64	314
8	wartortle	63	80	59	58	65	80	405
9	blastoise	83	100	79	78	85	105	530
10	caterpie	30	35	45	45	20	20	195
11	metapod	20	55	50	30	25	25	205
12	butterfree	45	50	60	70	90	80	395
13	weedle	35	30	40	50	20	20	195
14	kakuna	25	50	45	35	25	25	205

A sampling of our DML (cont.)

Output top 10 Pokemon with highest combined base statistics

```
create view highest_pokemon_stat as
SELECT pokemon.pok_id, pokemon.pok_name, base_stats.b_atk, base_stats.b_def, base_stats.b_hp,
base_stats.b_speed, base_stats.b_sp_atk, base_stats.b_sp_def,
sum(base_stats.b_atk + base_stats.b_def + base_stats.b_hp + base_stats.b_speed + base_stats.b_sp_atk + base_stats.b_sp_def)
as TOTAL
FROM pokemon
INNER JOIN base_stats
ON pokemon.pok_id
WHERE pokemon.pok_id = base_stats.pok_id
GROUP BY pokemon.pok_id
ORDER BY TOTAL DESC LIMIT 10
```

```
1 • SELECT * FROM pokedex.highest_pokemon_stat;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

pok_id	pok_name	b_atk	b_def	b_hp	b_speed	b_sp_atk	b_sp_def	TOTAL
493	arceus	120	120	120	120	120	120	720
150	mewtwo	110	90	106	130	154	90	680
484	palkia	120	100	90	100	150	120	680
643	reshiram	120	100	100	90	150	120	680
644	zekrom	150	120	100	90	120	100	680
716	xerneas	131	95	126	99	131	98	680
384	rayquaza	150	90	105	95	150	90	680
487	giratina-altered	100	120	150	90	100	120	680
717	yveltal	131	95	126	99	131	98	680
249	lugia	90	130	106	110	90	154	680

A sampling of our DML (cont.)

```
DELIMITER //
CREATE PROCEDURE `output_pokemon_type` (IN var1 varchar(8))
BEGIN
SELECT pokemon.pok_id, pokemon.pok_name, types.type_name
FROM pokemon
INNER JOIN pokemon_types
ON pokemon.pok_id = pokemon_types.pok_id
INNER JOIN types
ON pokemon_types.type_id = types.type_id
WHERE types.type_name LIKE var1;
END//
```

Output all Pokemon of a specified type

```
1 • call output_pokemon_type('fire');
```

Result Grid | Filter Rows: | Export:

pok_id	pok_name	type_name
218	slugma	fire
219	magcargo	fire
228	houndour	fire
229	houndoom	fire
240	magby	fire
244	entei	fire
250	ho-oh	fire
255	torchic	fire
256	combusken	fire
257	blaziken	fire
322	numel	fire
323	camerupt	fire
324	torkoal	fire
390	chimchar	fire
391	monferno	fire

Selected Stored Procedures

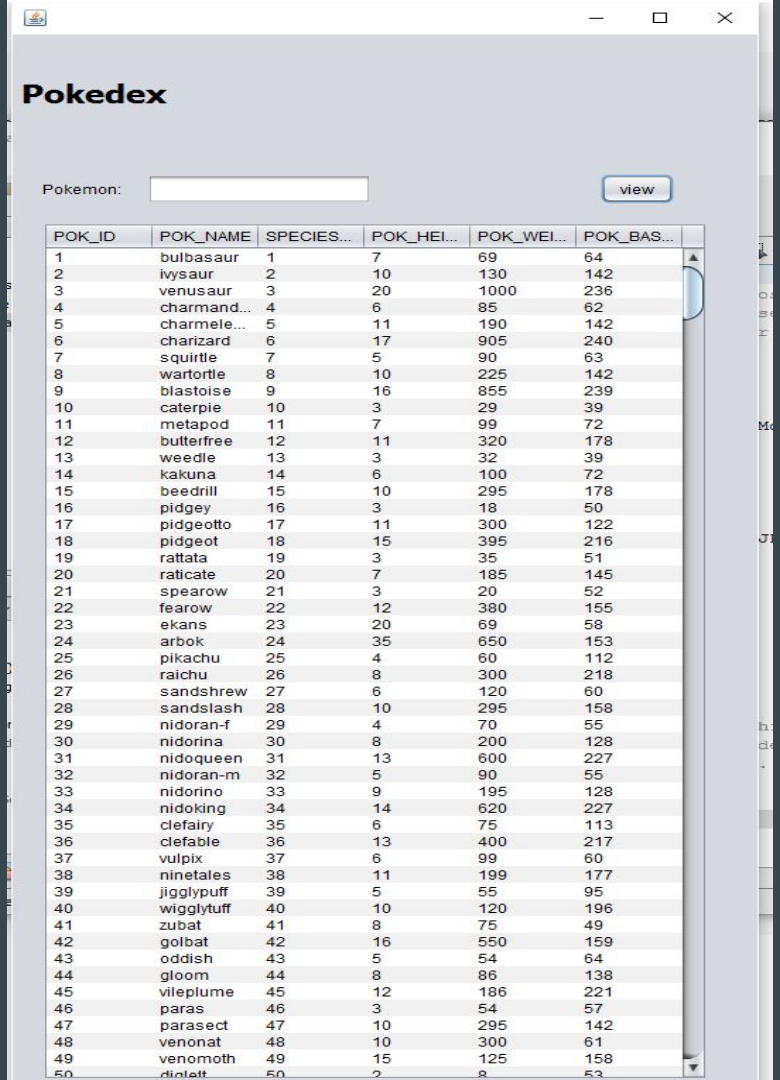
- Calculate the damage of attacks (damage formula)

$$Damage = \left(\frac{2 \times Level + 10}{250} \times \frac{Attack}{Defense} \times Base + 2\right) \times Modifier$$

$$Modifier = STAB \times Type \times Critical \times other \times (random \in [0.85, 1])$$

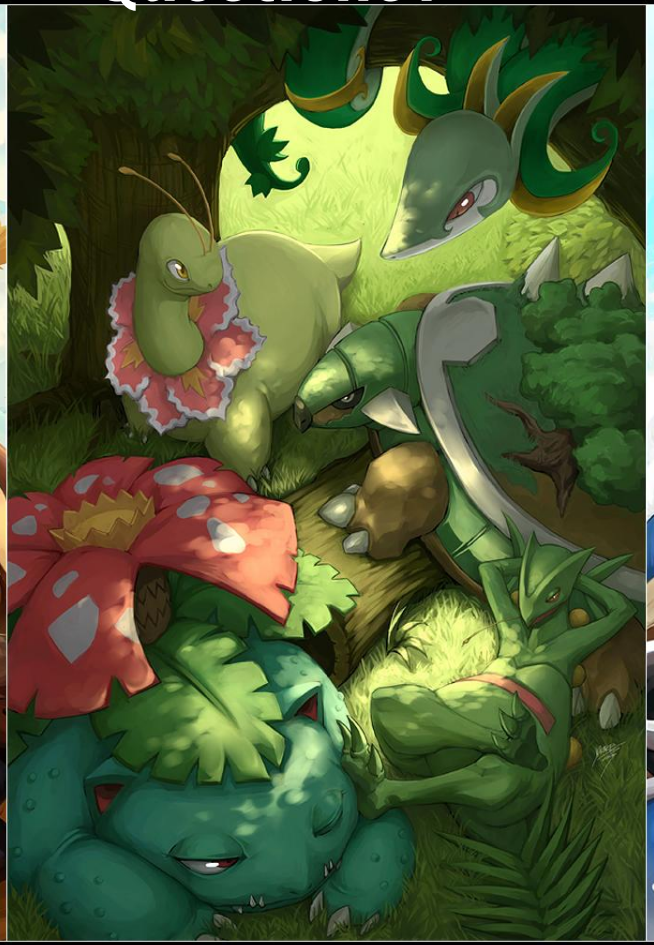
- Calculate if a pokemon would faint depending on an attack
- Get all Pokemon who reside in a certain habitat (cave, forest, sea, etc.)
- Determine if an evolved Pokemon has new moves

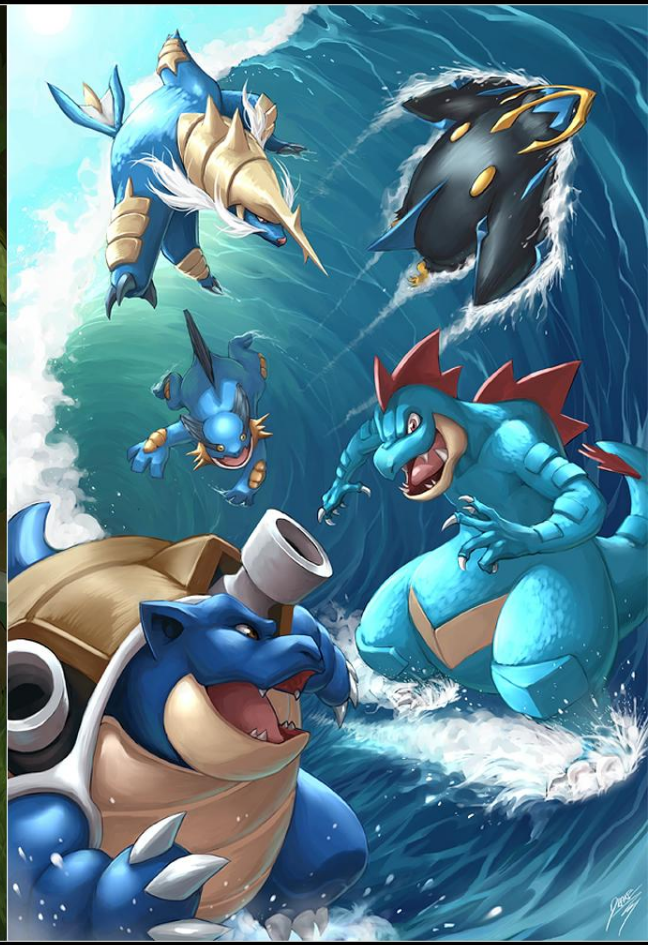
A very (very) basic start of a GUI



POK_ID	POK_NAME	SPECIES...	POK_HEI...	POK_WEI...	POK_BAS...
1	bulbasaur	1	7	69	64
2	ivysaur	2	10	130	142
3	venusaur	3	20	1000	236
4	charmand...	4	6	85	62
5	charmele...	5	11	190	142
6	charizard	6	17	905	240
7	squirtle	7	5	90	63
8	wartortle	8	10	225	142
9	blastoise	9	16	855	239
10	caterpie	10	3	29	39
11	metapod	11	7	99	72
12	butterfree	12	11	320	178
13	weedle	13	3	32	39
14	kakuna	14	6	100	72
15	beedrill	15	10	295	178
16	pidgey	16	3	18	50
17	pidgeotto	17	11	300	122
18	pidgeot	18	15	395	216
19	rattata	19	3	35	51
20	raticate	20	7	185	145
21	spearow	21	3	20	52
22	fearow	22	12	380	155
23	ekans	23	20	69	58
24	arbok	24	35	650	153
25	pikachu	25	4	60	112
26	raichu	26	8	300	218
27	sandshrew	27	6	120	60
28	sandslash	28	10	295	158
29	nidoran-f	29	4	70	55
30	nidorina	30	8	200	128
31	nidoqueen	31	13	600	227
32	nidoran-m	32	5	90	55
33	nidorino	33	9	195	128
34	nidoking	34	14	620	227
35	clefairy	35	6	75	113
36	clefable	36	13	400	217
37	vulpix	37	6	99	60
38	ninetales	38	11	199	177
39	jigglypuff	39	5	55	95
40	wigglytuff	40	10	120	196
41	zubat	41	8	75	49
42	golbat	42	16	550	159
43	oddish	43	5	54	64
44	gloom	44	8	86	138
45	vileplume	45	12	186	221
46	paras	46	3	54	57
47	parasect	47	10	295	142
48	venonat	48	10	300	61
49	venomoth	49	15	125	158
50	diglett	50	2	8	53

Questions?





Art By Drake Tsui