Sprawozdanie - Zaawansowane technologie bazodanowe

Laboratorium 2 - 08.11.2019

Neo4j

Dominik Wróbel

Dodanie budynków do bazy danych

Etykieta Building, atrybut name z nazwą budynku.

CREATE

(s1:Building {name:"S-1"}), (s2:Building {name:"S-2"}), (d1:Building {name:"D-1"}),

(u2:Building {name:"U-2"}), (a4:Building {name:"A-4"}), (a3:Building {name:"A-3"}),

(c4:Building {name:"C-4"}), (c5:Building {name:"C-5"}), (c6:Building {name:"C-6"}),

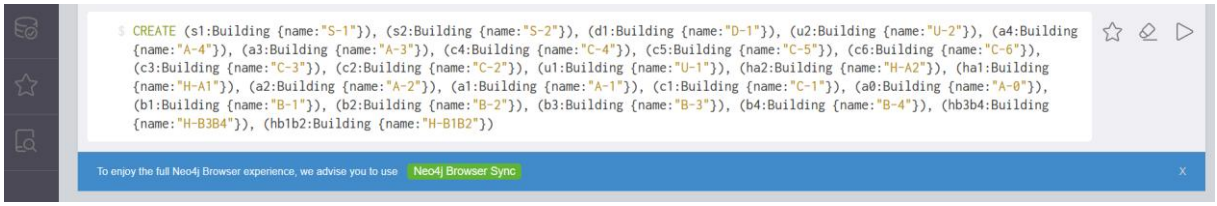
(c3:Building {name:"C-3"}), (c2:Building {name:"C-2"}), (u1:Building {name:"U-1"}),

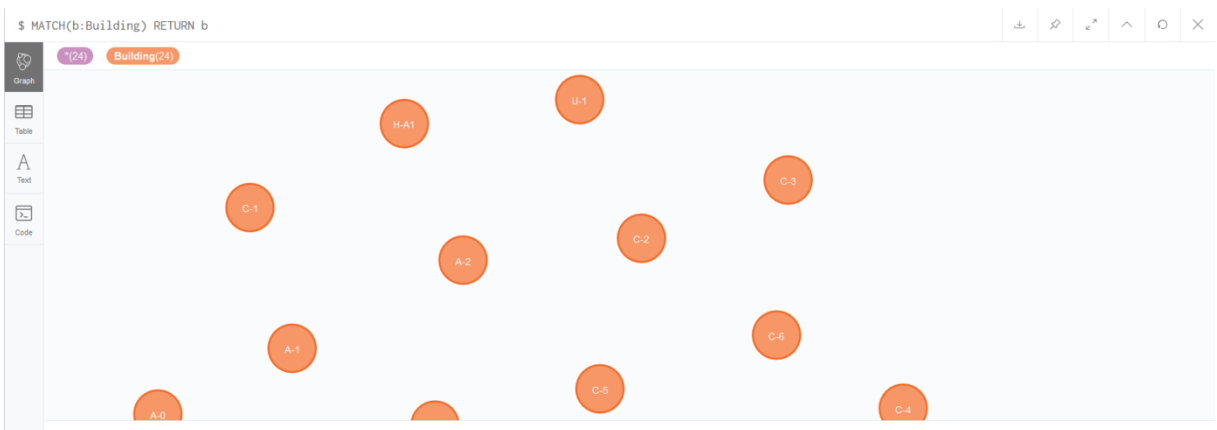
(ha2:Building {name:"H-A2"}), (ha1:Building {name:"H-A1"}), (a2:Building {name:"A-2"}),

(a1:Building {name:"A-1"}), (c1:Building {name:"C-1"}), (a0:Building {name:"A-0"}),

(b1:Building {name:"B-1"}), (b2:Building {name:"B-2"}), (b3:Building {name:"B-3"}),

(b4:Building {name:"B-4"}), (hb3b4:Building {name:"H-B3B4"}), (hb1b2:Building {name:"H-B1B2"})

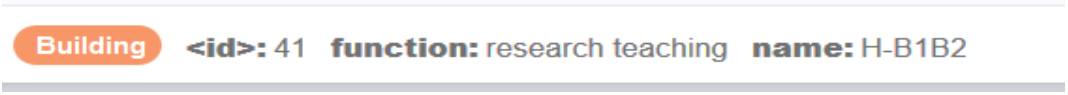




Tworzenie funkcji budynków

Dodawany do budynków atrybut function ma wartości ‘service’ lub ‘research teaching’

```
MATCH(b1:Building {name:"S-1"}) SET b1.function = 'service'

MATCH(b2:Building {name:"S-2"}) SET b2.function = 'service'

MATCH(b3:Building {name:"D-1"}) SET b3.function = 'research teaching'

MATCH(b4:Building {name:"U-2"}) SET b4.function = 'research teaching'

MATCH(b5:Building {name:"A-4"}) SET b5.function = 'research teaching'

MATCH(b6:Building {name:"A-3"}) SET b6.function = 'research teaching'

MATCH(b7:Building {name:"C-4"}) SET b7.function = 'research teaching'

MATCH(b8:Building {name:"C-5"}) SET b8.function = 'research teaching'

MATCH(b9:Building {name:"C-6"}) SET b9.function = 'research teaching'

MATCH(b10:Building {name:"C-3"}) SET b10.function = 'research teaching'

MATCH(b11:Building {name:"C-2"}) SET b11.function = 'research teaching'

MATCH(b12:Building {name:"U-1"}) SET b12.function = 'research teaching'

MATCH(b13:Building {name:"H-A2"}) SET b13.function = 'research teaching'

MATCH(b14:Building {name:"H-A1"}) SET b14.function = 'research teaching'

MATCH(b15:Building {name:"A-2"}) SET b15.function = 'research teaching'

MATCH(b16:Building {name:"A-1"}) SET b16.function = 'research teaching'

MATCH(b17:Building {name:"C-1"}) SET b17.function = 'research teaching'

MATCH(b18:Building {name:"A-0"}) SET b18.function = 'research teaching'

MATCH(b19:Building {name:"B-1"}) SET b19.function = 'research teaching'

MATCH(b20:Building {name:"B-2"}) SET b20.function = 'research teaching'

MATCH(b21:Building {name:"B-3"}) SET b21.function = 'research teaching'

MATCH(b22:Building {name:"B-4"}) SET b22.function = 'research teaching'

MATCH(b23:Building {name:"H-B3B4"}) SET b23.function = 'research teaching'

MATCH(b24:Building {name:"H-B1B2"}) SET b24.function = 'research teaching'
```



Informacje o sąsiedztwie budynków

Pomiędzy budynkami utworzono relację CONNECTS_TO, która zawiera atrybut floor określający na którym piętrze istnieje połączenie pomiędzy budynkami.

```
MATCH (b1:Building {name:"D-1"}),(b2:Building {name:"A-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"D-1"}),(b2:Building {name:"U-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 2}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"U-2"}),(b2:Building {name:"A-3"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"U-2"}),(b2:Building {name:"A-3"})
CREATE (b1)-[r:CONNECTS_TO {floor: 1}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"A-3"}),(b2:Building {name:"A-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"A-3"}),(b2:Building {name:"A-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 1}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"A-3"}),(b2:Building {name:"A-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 2}]->(b2)
RETURN r

MATCH (b1:Building {name:"A-3"}),(b2:Building {name:"A-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 3}]->(b2)
RETURN r

MATCH (b1:Building {name:"A-3"}),(b2:Building {name:"A-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r

MATCH (b1:Building {name:"A-4"}),(b2:Building {name:"C-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r

MATCH (b1:Building {name:"C-4"}),(b2:Building {name:"C-6"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"C-4"}),(b2:Building {name:"C-6"})
CREATE (b1)-[r:CONNECTS_TO {floor: 1}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"C-6"}),(b2:Building {name:"C-5"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"H-A2"}),(b2:Building {name:"H-A1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"H-A2"}),(b2:Building {name:"H-A1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 1}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"H-A2"}),(b2:Building {name:"H-A1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 2}]->(b2)
RETURN r
```

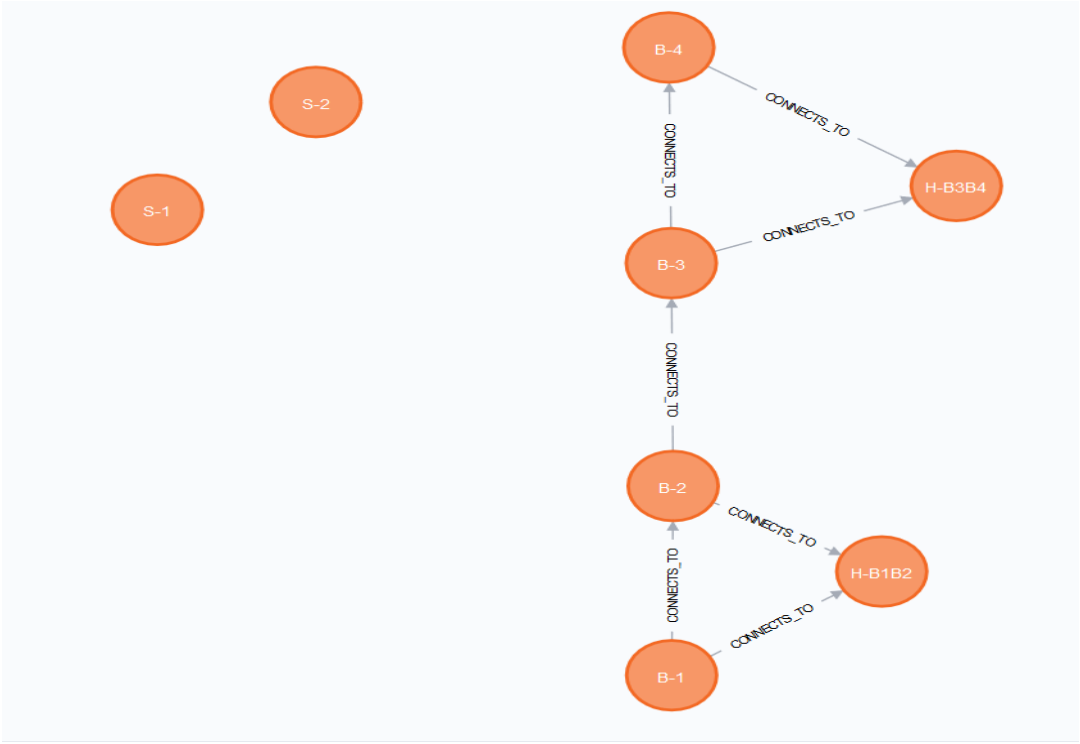
```
MATCH (b1:Building {name:"H-A2"}),(b2:Building {name:"H-A1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 3}]->(b2)
RETURN r
```

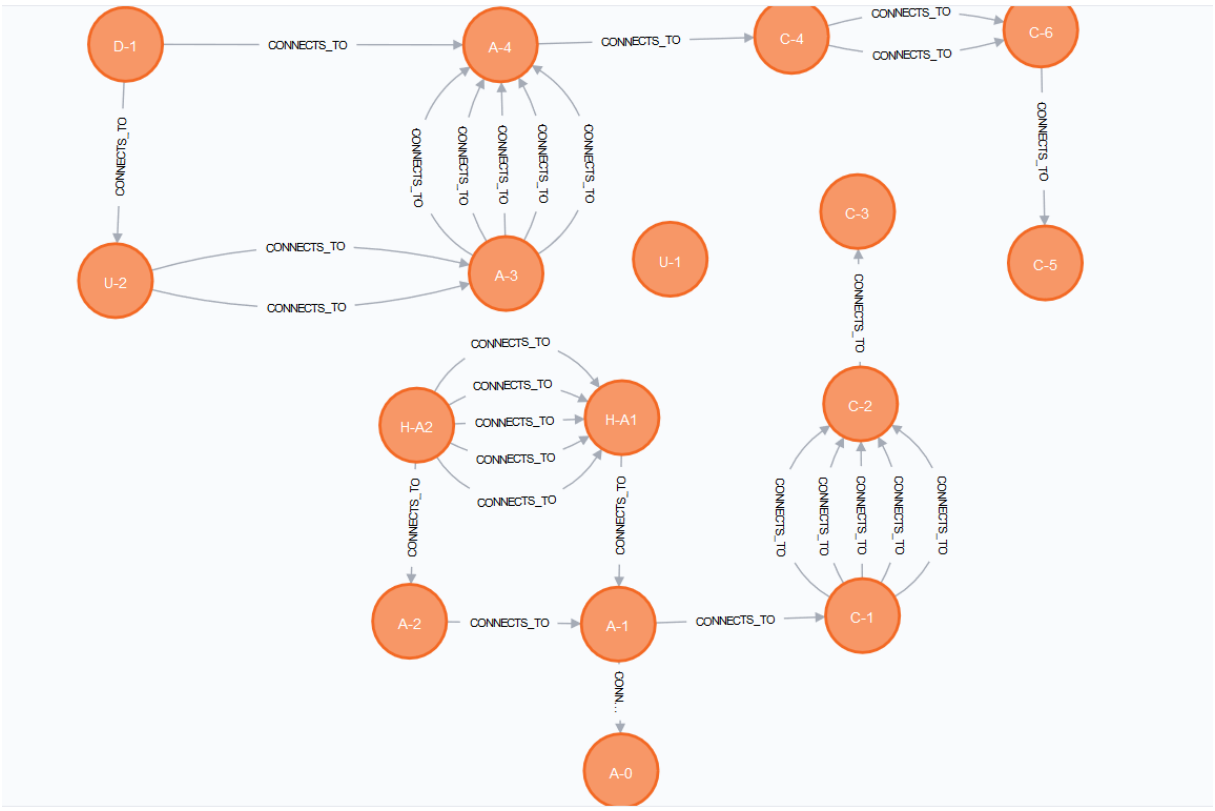
```
MATCH (b1:Building {name:"H-A2"}),(b2:Building {name:"H-A1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"H-A2"}),(b2:Building {name:"A-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 2}]->(b2)
RETURN r

MATCH (b1:Building {name:"A-2"}),(b2:Building {name:"A-1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 1}]->(b2)
RETURN r

MATCH (b1:Building {name:"H-A1"}),(b2:Building {name:"A-1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r

MATCH (b1:Building {name:"A-1"}),(b2:Building {name:"A-0"})
CREATE (b1)-[r:CONNECTS_TO {floor: 3}]->(b2)
RETURN r

MATCH (b1:Building {name:"A-1"}),(b2:Building {name:"C-1"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r

MATCH (b1:Building {name:"C-1"}),(b2:Building {name:"C-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"C-1"}),(b2:Building {name:"C-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 1}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"C-1"}),(b2:Building {name:"C-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 2}]->(b2)
RETURN r

MATCH (b1:Building {name:"C-1"}),(b2:Building {name:"C-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 3}]->(b2)
RETURN r

MATCH (b1:Building {name:"C-1"}),(b2:Building {name:"C-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 4}]->(b2)
RETURN r

MATCH (b1:Building {name:"C-2"}),(b2:Building {name:"C-3"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r
```

```
MATCH (b1:Building {name:"B-1"}),(b2:Building {name:"B-2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"B-2"}),(b2:Building {name:"B-3"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"B-3"}),(b2:Building {name:"B-4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"B-1"}),(b2:Building {name:"H-B1B2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"B-2"}),(b2:Building {name:"H-B1B2"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"B-3"}),(b2:Building {name:"H-B3B4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r

MATCH (b1:Building {name:"B-4"}),(b2:Building {name:"H-B3B4"})
CREATE (b1)-[r:CONNECTS_TO {floor: 0}]->(b2)
RETURN r
```


B-4
S-2
CONNECTS_TO
H-B3B4
S-1
CONNECTS_TO
CONNECTS_TO
B-3
CONNECTS_TO
B-2
CONNECTS_TO
H-B1B2
CONNECTS_TO
CONNECTS_TO
B-1


D-1
CONNECTS_TO
A-4
CONNECTS_TO
C-4
CONNECTS_TO
CONNECTS_TO
C-6
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
C-5
U-2
CONNECTS_TO
CONNECTS_TO
A-3
U-1
C-3
CONNECTS_TO
CONNECTS_TO
H-A2
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
H-A1
C-2
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
CONNECTS_TO
A-2
CONNECTS_TO
A-1
CONNECTS_TO
C-1
CONN...
A-0

Siedziby wydziałów

Do węzłów będących wydziałami dodano atrybut faculty przechowujący skrót wydziału.

```
MATCH(b:Building {name:"B-1"}) SET b.faculty = 'EAIIB'

MATCH(b:Building {name:"B-2"}) SET b.faculty = 'IMiR'

MATCH(b:Building {name:"B-3"}) SET b.faculty = 'IMiIP'

MATCH(b:Building {name:"A-2"}) SET b.faculty = 'MN'

MATCH(b:Building {name:"A-1"}) SET b.faculty = 'GiG'

MATCH(b:Building {name:"C-1"}) SET b.faculty = 'IET'

MATCH(b:Building {name:"C-3"}) SET b.faculty = 'IET'
```

Sale, w których miałem zajęcia, numery pomieszczeń i ich związki z budynkami

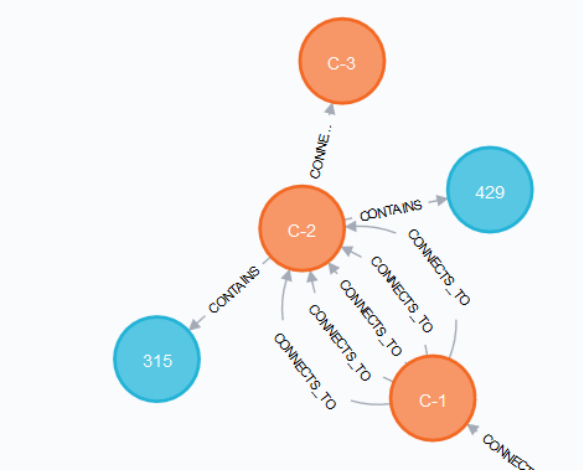
Wprowadzono nowy typ węzła o nazwie Classroom, węzeł ten ma atrybut number. Nowa relacja CONTAINS prowadzi od węzła Building do węzła Classroom i oznacza, że dana sala mieści się w danym budynku.

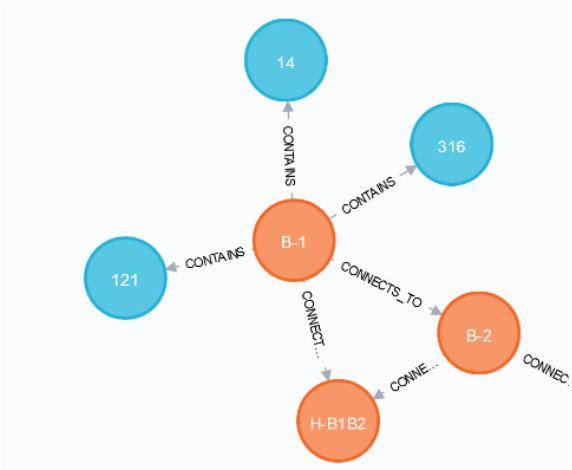
```
MATCH (b: Building {name: "C-1"})

CREATE (b)-[r:CONTAINS]->(c: Classroom {number: 224})

RETURN b,r,c;


MATCH (b: Building {name: "C-2"})

CREATE (b)-[r:CONTAINS]->(c: Classroom {number: 315})

RETURN b,r,c;


MATCH (b: Building {name: "C-2"})

CREATE (b)-[r:CONTAINS]->(c: Classroom {number: 429})

RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-1"})
CREATE (b)-[r:CONTAINS]->(c: Classroom {number: 121})
RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-1"})
CREATE (b)-[r:CONTAINS]->(c: Classroom {number: 14})
RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-1"})
CREATE (b)-[r:CONTAINS]->(c: Classroom {number: 316})
RETURN b,r,c;
```





Wejścia do budynków

Korzystając z wcześniej używanej relacji CONTAINS stworzono nowy typ węzła Entrance, który ma atrybut door ustawiany na wartość front lub back.

```
MATCH (b: Building {name: "C-2"})

CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})

RETURN b,r,c;
```

```
MATCH (b: Building {name: "C-2"})

CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'back'})

RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-1"})

CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})

RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-1"})

CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'back'})

RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-2"})

CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})

RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-3"})

CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})

RETURN b,r,c;
```

```
MATCH (b: Building {name: "B-4"})
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})
RETURN b,r,c;

MATCH (b: Building {name: "A-0"})
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})
RETURN b,r,c;

MATCH (b: Building {name: "S-1"})
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})
RETURN b,r,c;

MATCH (b: Building {name: "S-2"})
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})
RETURN b,r,c;

MATCH (b: Building {name: "A-4"})
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})
RETURN b,r,c;

MATCH (b: Building {name: "U-2"})
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'back'})
RETURN b,r,c;

MATCH (b: Building {name: "U-1"})
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})
RETURN b,r,c;
```

MATCH (b: Building {name: "C-1"})

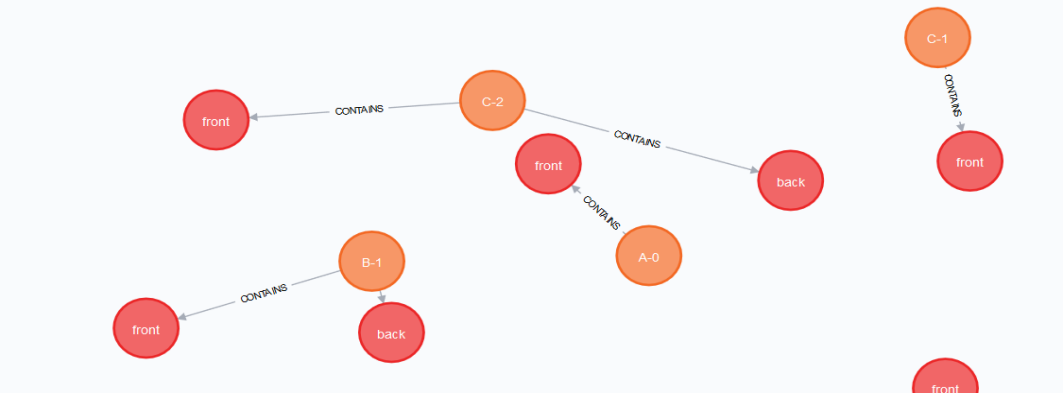
CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})

RETURN b,r,c;

MATCH (b: Building {name: "C-5"})

CREATE (b)-[r:CONTAINS]->(c: Entrance {door: 'front'})

RETURN b,r,c;



Czy występują samotne budynki, tj. takie, które nie są połączone z innymi budynkami

MATCH (b:Building) WHERE NOT (b)-[:CONNECTS_TO]-() RETURN b;

b

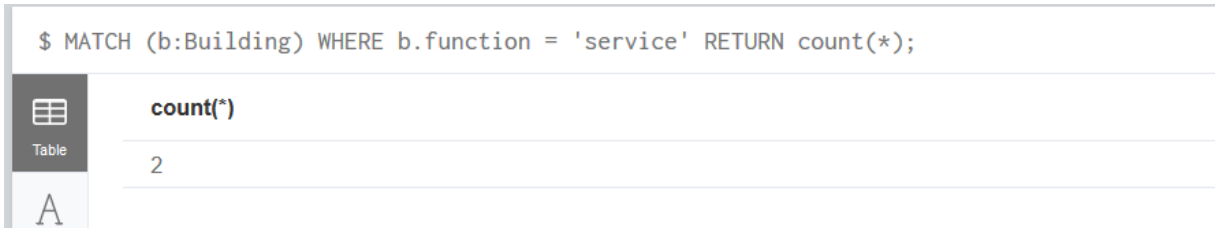

```
{
  "name": "S-1",
  "function": "service"
}
```

```
{
  "name": "S-2",
  "function": "service"
}
```

```
{
  "name": "U-1",
  "function": "research teaching"
}
```

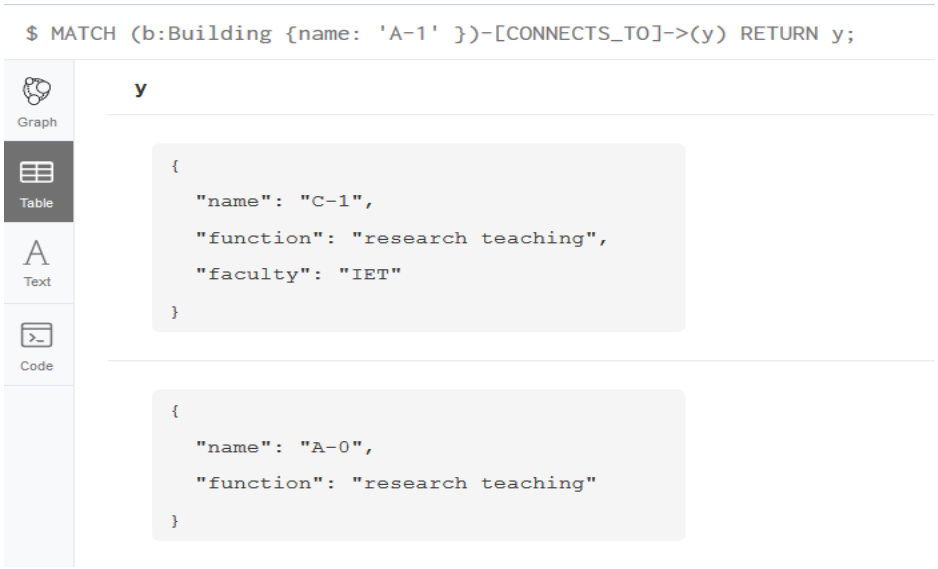
Ile jest budynków typu service

MATCH (b:Building) WHERE b.function = 'service' RETURN count(*);



Z jakimi budynkami połączony jest A-1

MATCH (b:Building {name: 'A-1' })-[CONNECTS_TO]->(y) RETURN y;



Z jakimi budynkami i na jakich piętrach połączony jest A-1

MATCH (b:Building {name: 'A-1' })-[r:CONNECTS_TO]->(y) RETURN b, r.floor;

Jaka jest najkrótsza droga (najmniejsza ilość odwiedzanych budynków) z parteru C-3 do wejścia w A-0?

MATCH (b:Building),(y:Building)

WHERE b.name = 'C-3' AND y.name = 'A-0'

MATCH p = shortestPath((b)-[:CONNECTS_TO*]-(y))

return p;


```
"p"
[{"name":"C-3","function":"research teaching","faculty":"IET"},{"floor
":0},{"name":"C-2","function":"research teaching"},{"name":"C-2","func
tion":"research teaching"},{"floor":4},{"name":"C-1","function":"resea
rch teaching","faculty":"IET"},{"name":"C-1","function":"research teac
hing","faculty":"IET"},{"floor":4},{"name":"A-1","function":"research
teaching","faculty":"GiG"},{"name":"A-1","function":"research teaching
","faculty":"GiG"},{"floor":3},{"name":"A-0","function":"research teac
hing"}]
```

Użyj curl do połączenia się z bazą danych i wykonania wybranego zapytania z poprzedniego ćwiczenia.

curl -X POST -H –g http://neo4j:neo4juser@localhost:7687/db/data/transaction/commit -d '{"statements": [{"statement": "MATCH (b:Building {name: 'A-1' }) RETURN b;"}]}'