

# The Cypher Style Guide

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This is the style guide for the Cypher language, in the context of its standardization through the openCypher project. This document consists of two main sections: [Rules](#) and [Recommendations](#).

In [Rules](#), we list syntax guidelines for composing Cypher queries in a conventional, readability-oriented way. The examples provided always transform *valid*, but poorly formatted, queries into a different query in the recommended format, whilst retaining the same semantics.

In [Recommendations](#), we list guidelines that may have an effect on the semantics of queries, such as the way a graph schema is composed through label and relationship types. Bear in mind that these recommendations will not work after-the-fact: if the graph has been constructed with one set of label and relationship types, queries in the associated workload cannot be re-formatted according to these recommendations without also refactoring the data graph.

# 1. Why is style important?

Consider this dadaist work of art from Nigel Small and Nicole White:

*Insane query*

```
MATCH (null)-[:merge]->(true)
with null.delete as foreach, `true`.false as null
return 2 + foreach, coalesce(null, 3.1415)
limit 10;
```

Then compare it to this classical piece by Mark Needham:

*Sane query*

```
MATCH (member:Member {name: 'Mark Needham'})
      -[:HAS_MEMBERSHIP]->()-[:OF_GROUP]->(Group)-[:HAS_TOPIC]->(topic)
WITH member, topic, count(*) AS score
MATCH (topic)<-[:HAS_TOPIC]-(otherGroup:Group)
WHERE NOT (member)-[:HAS_MEMBERSHIP]->(Membership)-[:OF_GROUP]->(otherGroup)
RETURN otherGroup.name, collect(topic.name), sum(score) AS score
ORDER BY score DESC
```

---

The purpose of this document is to help users of the language to share queries with each other with minimal friction, and to construct a consistent and portable usage of the language across many use cases and implementations.

## 2. Rules

In case two rules are in conflict, and there is no explicit mention of which rule trumps, the rule

mentioned last applies.

## 2.1. Indentation and line breaks

1. Start a new clause on a new line.

*Bad*

```
MATCH (n) WHERE n.name CONTAINS 's' RETURN n.name
```

*Good*

```
MATCH (n)
WHERE n.name CONTAINS 's'
RETURN n.name
```

- a. Indent **ON MATCH** and **ON CREATE** with two spaces.

*Bad*

```
MERGE (n) ON CREATE SET n.prop = 0
MERGE (a:A)-[:T]-(b:B)
ON CREATE SET a.name = 'me'
ON MATCH SET b.name = 'you'
RETURN a.prop
```

*Good*

```
MERGE (n)
  ON CREATE SET n.prop = 0
MERGE (a:A)-[:T]-(b:B)
  ON CREATE SET a.name = 'me'
  ON MATCH SET b.name = 'you'
RETURN a.prop
```

- b. Put **ON CREATE** before **ON MATCH** if both are present.

2. Start a subquery on a new line after the opening brace, indented with two (additional) spaces. Leave the closing brace on its own line.

*Bad*

```
MATCH (a:A)
WHERE
  EXISTS { MATCH (a)-->(b:B) WHERE b.prop = $param }
RETURN a.foo
```

*Also bad*

```
MATCH (a:A)
WHERE EXISTS
{MATCH (a)-->(b:B)
WHERE b.prop = $param}
RETURN a.foo
```

*Good*

```
MATCH (a:A)
WHERE EXISTS {
  MATCH (a)-->(b:B)
  WHERE b.prop = $param
}
RETURN a.foo
```

- a. Do not break the line if the simplified subquery form is used.

*Bad*

```
MATCH (a:A)
WHERE EXISTS {
  (a)-->(b:B)
}
RETURN a.prop
```

*Good*

```
MATCH (a:A)
WHERE EXISTS { (a)-->(b:B) }
RETURN a.prop
```

## 2.2. Meta-characters

1. Use single quotes (Unicode character U+0027: ') for literal string values.

*Bad*

```
RETURN "Cypher"
```

*Good*

```
RETURN 'Cypher'
```

- a. Disregard this rule for literal strings that contain a single quote character. If the string has both, use the form that creates the fewest escapes. In the case of a tie, prefer single quotes.

*Bad*

```
RETURN 'Cypher\'s a nice language', "Mats' quote: \"statement\""
```

*Good*

```
RETURN "Cypher's a nice language", 'Mats\' quote: "statement"'
```

2. Avoid having to use back-ticks to escape characters and keywords.

*Bad*

```
MATCH (`odd-ch@racter$: `Spaced Label` {`&property`: 42})  
RETURN labels(`odd-ch@racter`)
```

*Good*

```
MATCH (node:NonSpacedLabel {property: 42})  
RETURN labels(node)
```

3. Do not use a semicolon at the end of the statement.

*Bad*

```
RETURN 1;
```

*Good*

```
RETURN 1
```

## 2.3. Casing

1. Write keywords in upper case.

*Bad*

```
match (p:Person)  
where p.name starts with 'Ma'  
return p.name
```

*Good*

```
MATCH (p:Person)
WHERE p.name STARTS WITH 'Ma'
RETURN p.name
```

2. Write the value `null` in lower case.

*Bad*

```
WITH NULL AS n1, Null AS n2
RETURN n1 IS NULL AND n2 IS NOT NULL
```

*Good*

```
WITH null AS n1, null as n2
RETURN n1 IS NULL AND n2 IS NOT NULL
```

3. Write boolean literals in lower case.

*Bad*

```
WITH TRUE AS b1, False AS b2
RETURN b1 AND b2
```

*Good*

```
WITH true AS b1, false AS b2
RETURN b1 AND b2
```

4. Use camel case, starting with a lower case character, for:

- a. functions
- b. properties
- c. variables
- d. parameters

*Bad*

```
CREATE (N {Prop: 0})
WITH RAND() AS Rand, $pArAm AS MAP
RETURN Rand, MAP.property_key, Count(N)
```

*Good*

```
CREATE (n {prop: 0})  
WITH rand() AS rand, $param AS map  
RETURN rand, map.propertyKey, count(n)
```

## 2.4. Patterns

1. When patterns wrap lines, break after arrows, not before.

*Bad*

```
MATCH (:Person)-->(vehicle:Car)-->(:Company)  
      <--(:Country)  
RETURN count(vehicle)
```

*Good*

```
MATCH (:Person)-->(vehicle:Car)-->(:Company)<--  
      (:Country)  
RETURN count(vehicle)
```

2. Use anonymous nodes and relationships when the variable would not be used.

*Bad*

```
CREATE (a:End {prop: 42}),  
      (b:End {prop: 3}),  
      (c:Begin {prop: id(a)})
```

*Good*

```
CREATE (a:End {prop: 42}),  
      (:End {prop: 3}),  
      (:Begin {prop: id(a)})
```

3. Chain patterns together to avoid repeating variables.

*Bad*

```
MATCH (:Person)-->(vehicle:Car), (vehicle:Car)-->(:Company)  
RETURN count(vehicle)
```



*Good*

```
MATCH (:Person)-->(vehicle:Car)-->(:Company)
RETURN count(vehicle)
```

- Put named nodes before anonymous nodes.

*Bad*

```
MATCH ()-->(vehicle:Car)-->(manufacturer:Company)
WHERE manufacturer.foundedYear < 2000
RETURN vehicle.mileage
```

*Good*

```
MATCH (manufacturer:Company)<--(vehicle:Car)<--()
WHERE manufacturer.foundedYear < 2000
RETURN vehicle.mileage
```

- Keep anchor nodes at the beginning of the **MATCH** clause.

*Bad*

```
MATCH (:Person)-->(vehicle:Car)-->(manufacturer:Company)
WHERE manufacturer.foundedYear < 2000
RETURN vehicle.mileage
```

*Good*

```
MATCH (manufacturer:Company)<--(vehicle:Car)<--(:Person)
WHERE manufacturer.foundedYear < 2000
RETURN vehicle.mileage
```

- Prefer outgoing (left to right) pattern relationships to incoming pattern relationships.

*Bad*

```
MATCH (:Country)-->(:Company)<--(vehicle:Car)<--(:Person)
RETURN vehicle.mileage
```

*Good*

```
MATCH (:Person)-->(vehicle:Car)-->(:Company)<--(:Country)
RETURN vehicle.mileage
```

## 2.5. Spacing

1. For literal maps:
  - a. No space between the opening brace and the first key
  - b. No space between key and colon
  - c. One space between colon and value
  - d. No space between value and comma
  - e. One space between comma and next key
  - f. No space between the last value and the closing brace

*Bad*

```
WITH { key1 : 'value' ,key2 : 42 } AS map
RETURN map
```

*Good*

```
WITH {key1: 'value', key2: 42} AS map
RETURN map
```

2. No padding space for parameters.
  - a. This rule mentions deprecated syntax. See [Parameter Syntax](#).

*Bad*

```
RETURN { param }
```

*Good*

```
RETURN {param}
```

3. One space between label/type predicates and property predicates in patterns.

*Bad*

```
MATCH (p:Person{property: -1})-[:KNOWS {since: 2016}]->()
RETURN p.name
```

*Good*

```
MATCH (p:Person {property: -1})-[:KNOWS {since: 2016}]->()
RETURN p.name
```

4. No space in patterns.

*Bad*

```
MATCH (:Person) --> (:Vehicle)
RETURN count(*)
```

*Good*

```
MATCH (:Person)-->(:Vehicle)
RETURN count(*)
```

5. Use a wrapping space around operators.

*Bad*

```
MATCH p=(s)-->(e)
WHERE s.name<>e.name
RETURN length(p)
```

*Good*

```
MATCH p = (s)-->(e)
WHERE s.name <> e.name
RETURN length(p)
```

6. No space in label predicates.

*Bad*

```
MATCH (person : Person : Owner )
RETURN person.name
```

*Good*

```
MATCH (person:Person:Owner)
RETURN person.name
```

7. Use a space after each comma in lists and enumerations.

*Bad*

```
MATCH (),()
WITH ['a','b',3.14] AS list
RETURN list,2,3,4
```

*Good*

```
MATCH (), ()  
WITH ['a', 'b', 3.14] AS list  
RETURN list, 2, 3, 4
```

8. No padding space within function call parentheses.

*Bad*

```
RETURN split( 'original', 'i' )
```

*Good*

```
RETURN split('original', 'i')
```

9. Use padding space within simple subquery expressions.

*Bad*

```
MATCH (a:A)  
WHERE EXISTS {(a)-->(b:B)}  
RETURN a.prop
```

*Good*

```
MATCH (a:A)  
WHERE EXISTS { (a)-->(b:B) }  
RETURN a.prop
```

## 3. Recommendations

- When using Cypher language constructs in prose, use a monospaced font and follow the styling rules.
  - When referring to labels and relationship types, the colon should be included as follows: `:Label`, `:REL_TYPE`.
  - When referring to functions, use lower camel case and parentheses should be used as follows: `shortestPath()`. Arguments should normally not be included.
- If you are storing Cypher statements in a separate file, use the file extension `.cypher`.

### 3.1. Graph modelling

1. Prefer single nouns for labels.

*Bad*

```
MATCH (e:IsEmployed)
RETURN e.name
```

*Good*

```
MATCH (e:Employee)
RETURN e.name
```

2. Write labels in camel case, starting with an upper case character.

*Bad*

```
MATCH (e:editor_in_chief)-->(:EMPLOYEE)
RETURN e.name
```

*Good*

```
MATCH (e:EditorInChief)-->(:Employee)
RETURN e.name
```

3. Write relationship types in upper case, using an underscore (   ) to separate words.

*Bad*

```
MATCH (:Person)-[own:ownsVehicle]->(:Car)
RETURN own.since
```

*Good*

```
MATCH (:Person)-[own:OWNS_VEHICLE]->(:Car)
RETURN own.since
```