# Technical Report for the First Iteration of Evaluation

## Queries

We have the following regular template:

```
1: "a*",
2: "ab*",
3: "a?b*",
4: "ab",
5: "a*/b*",
6: "a*/b*/c",
7: "a/b/c",
8: "a/b*/c",
9: "(a | b | c)*",
10: "(a | b |c)/b*"
```

And we instantiate two data constraint into the regular expressions

ABS: exists a parameter p, such that

```
|?p - attr| < constant
```

And the equal data constraint is:

```
?p - attr < c and attr - ?p < c
```

Max and Min: query the maximum and minimum value of an attribute `attr', i.e.

```
?p >= attr and ?q <= attr
```

## Experiment Setup

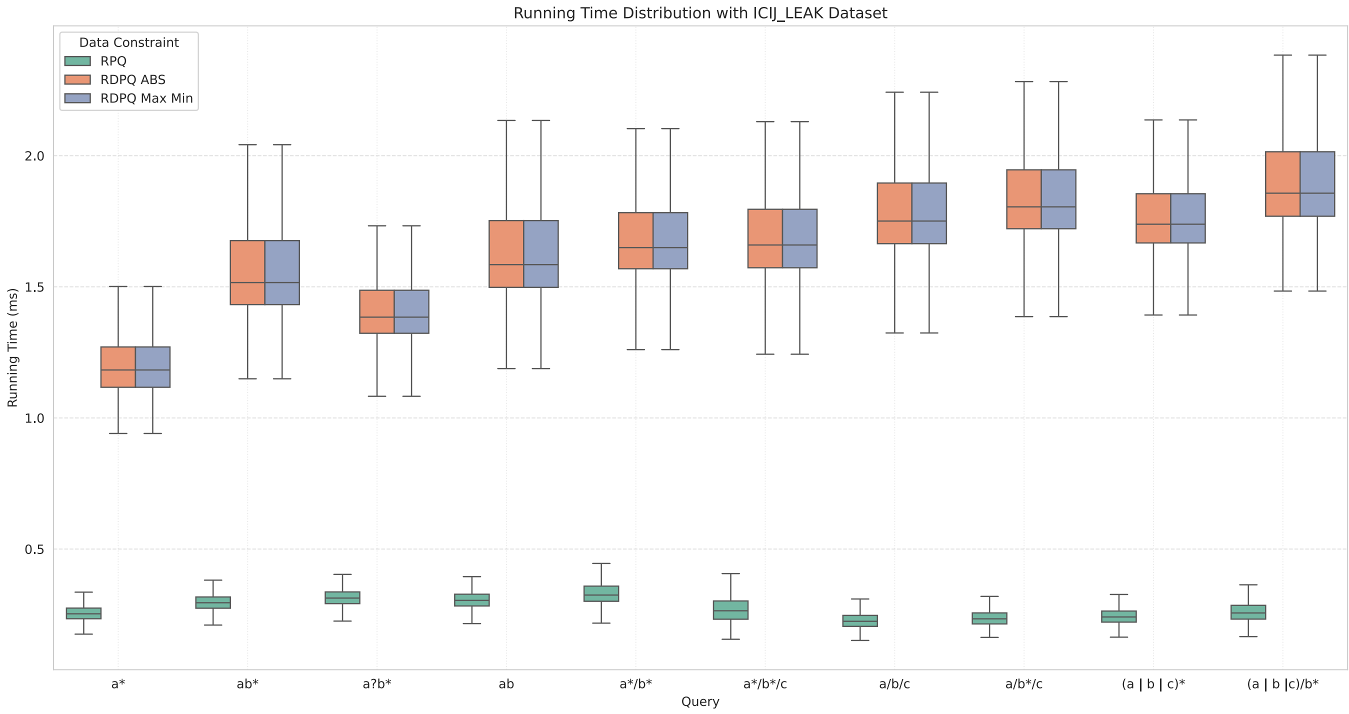
The experiment was run on a ubuntu subsystem on a windows 11 Laptop with i7-13700H Core CPU and 16 GB assigned memories. The following table shows the stat of each dataset.

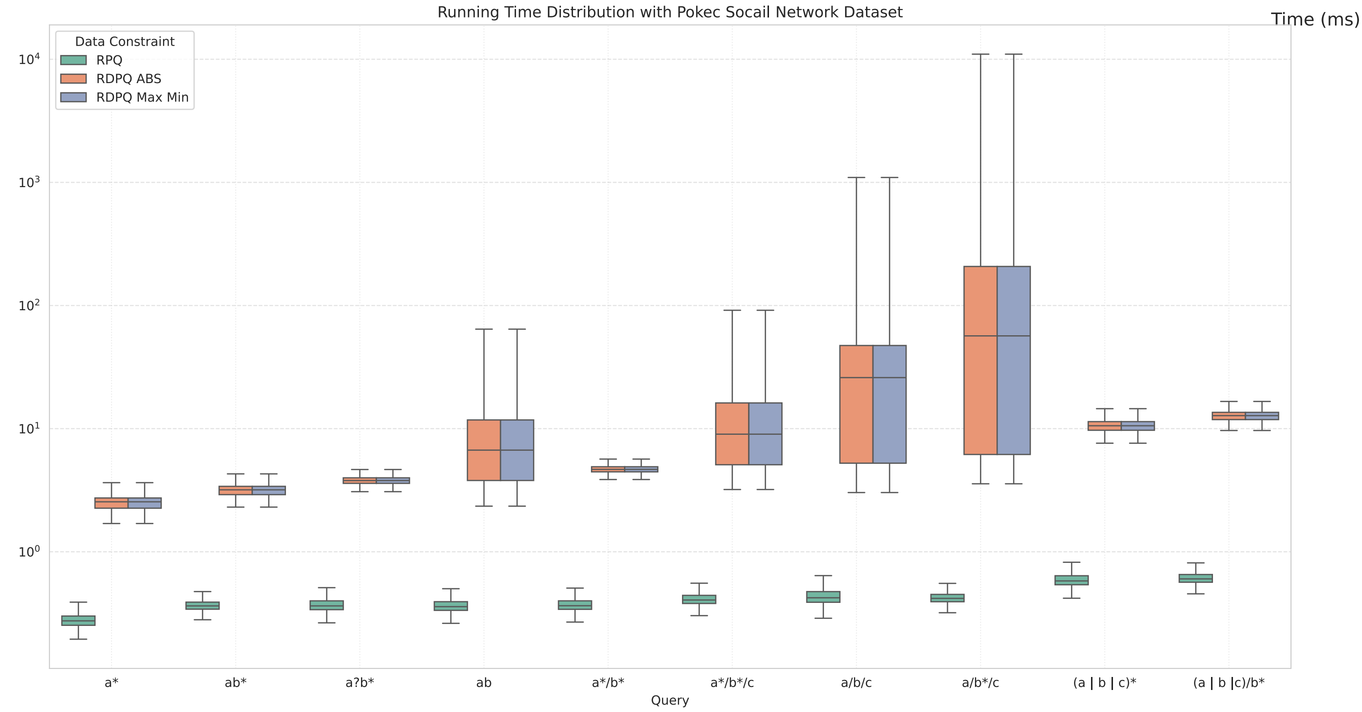
| Dataset | Node Number | Edge Number | Queries for Each Template | Queries in Total |
|---|---|---|---|---|
| ICIJ-Leak | 1908466 | 3193390 | 10000 | 200000 |
| Pokec | 1632803 | 30622564 | 10000 | 200000 |
| ICIJ-Paradise | 163414 | 364456 | 1000 | 20000 |

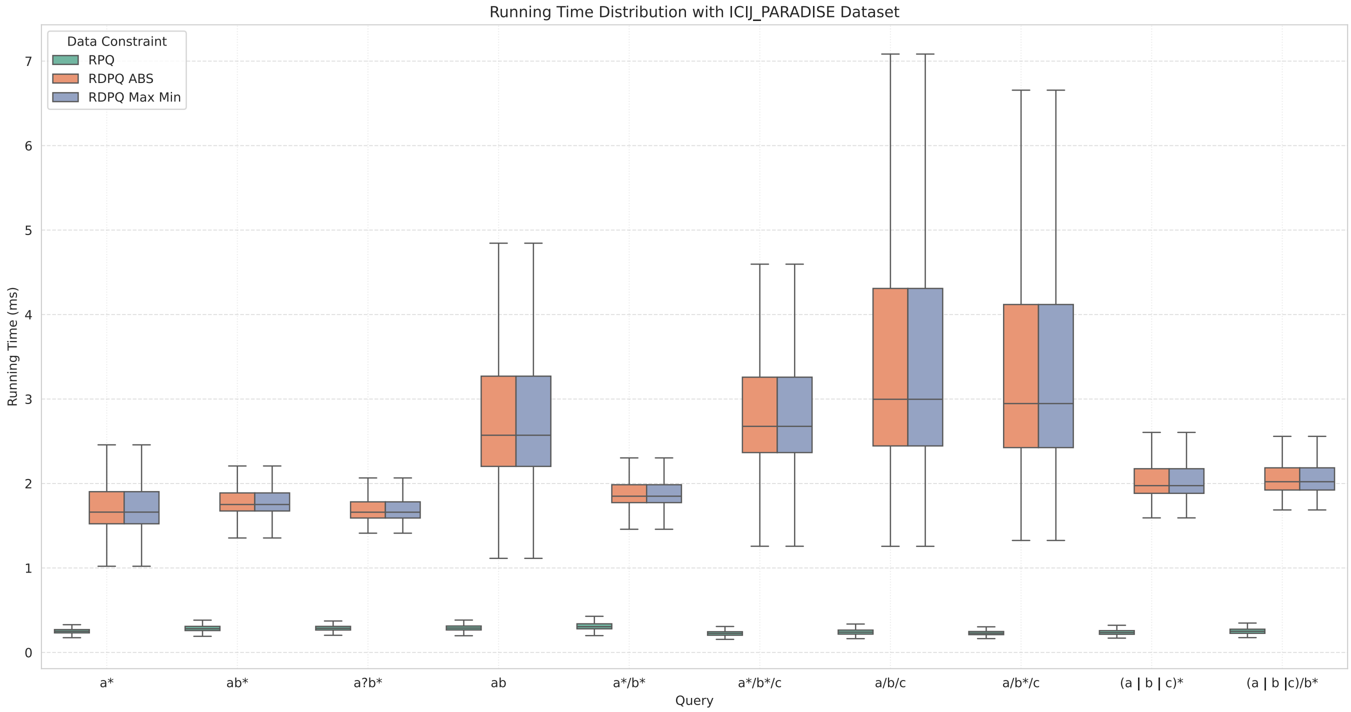
| Dataset | Node Number | Edge Number | Queries for Each Template | Queries in Total |
|---|---|---|---|---|
| Telecom | 170k | 50M | 1000 | 20000 |

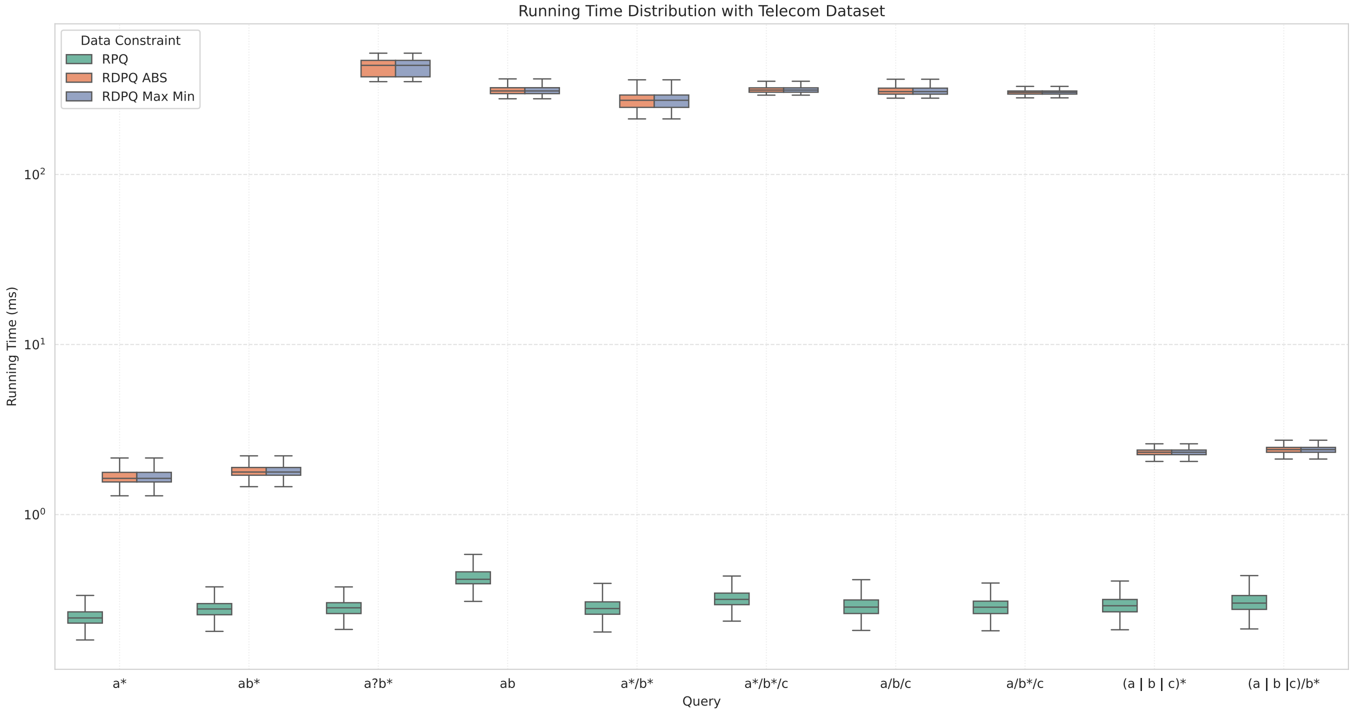
# Time Performance:

The following box figures show the stata of running time on each dataset. For Pokec and Telecom dataset, the span of data is relatively large, so I use the logarithm coordinate.


Running Time Distribution with ICIJ_LEAK Dataset


Running Time Distribution with Pokec Socail Network Dataset





# Average SMT Formulas Checked Each Step:

It is a constant 3, since we have insert the same formula to each atom of regular expressions.

Problem: how to take make-sense queries without change the semantics of regular expression.

For example. if we want to test the difference of $attr$ between two objects less or equal than 5, we need

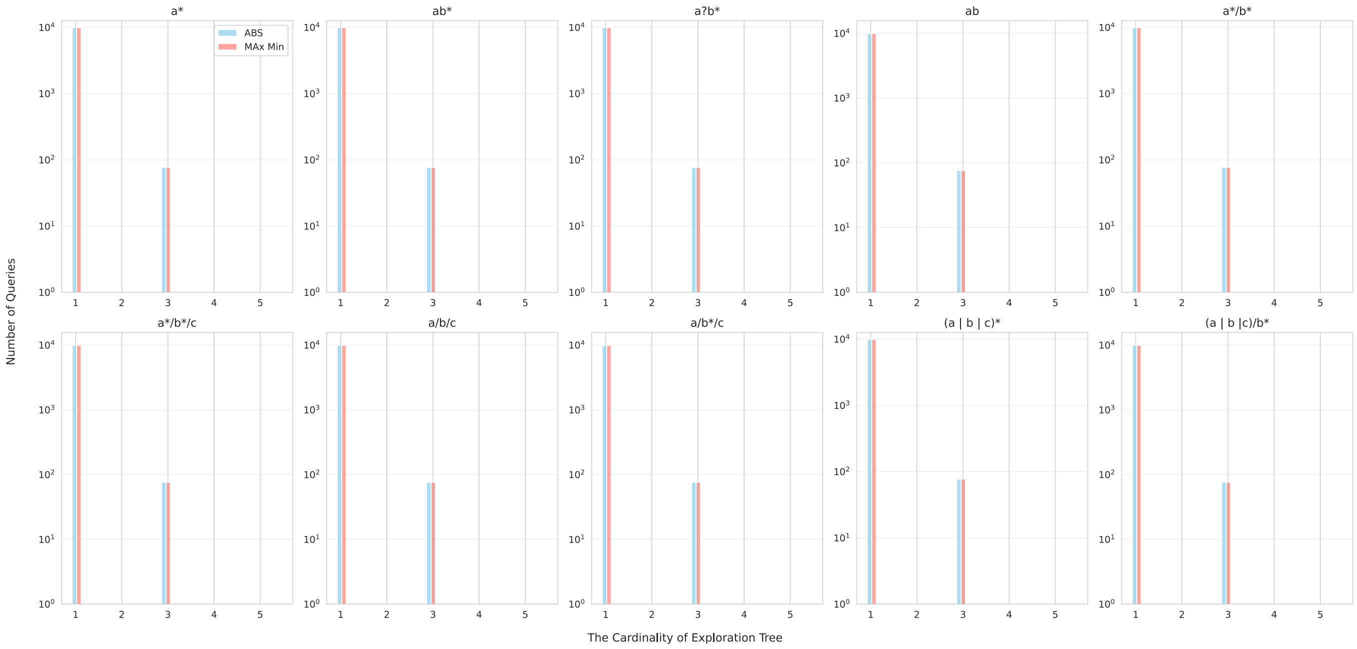
```
?p = attr and ?q < attr /( ?p > attr > ?q)* /
 ?p > attr and ?q = attr and ?p - ?q < 5

/*We omit the labels of objects */
```

We can not instantiate such formula to regex end with $*$

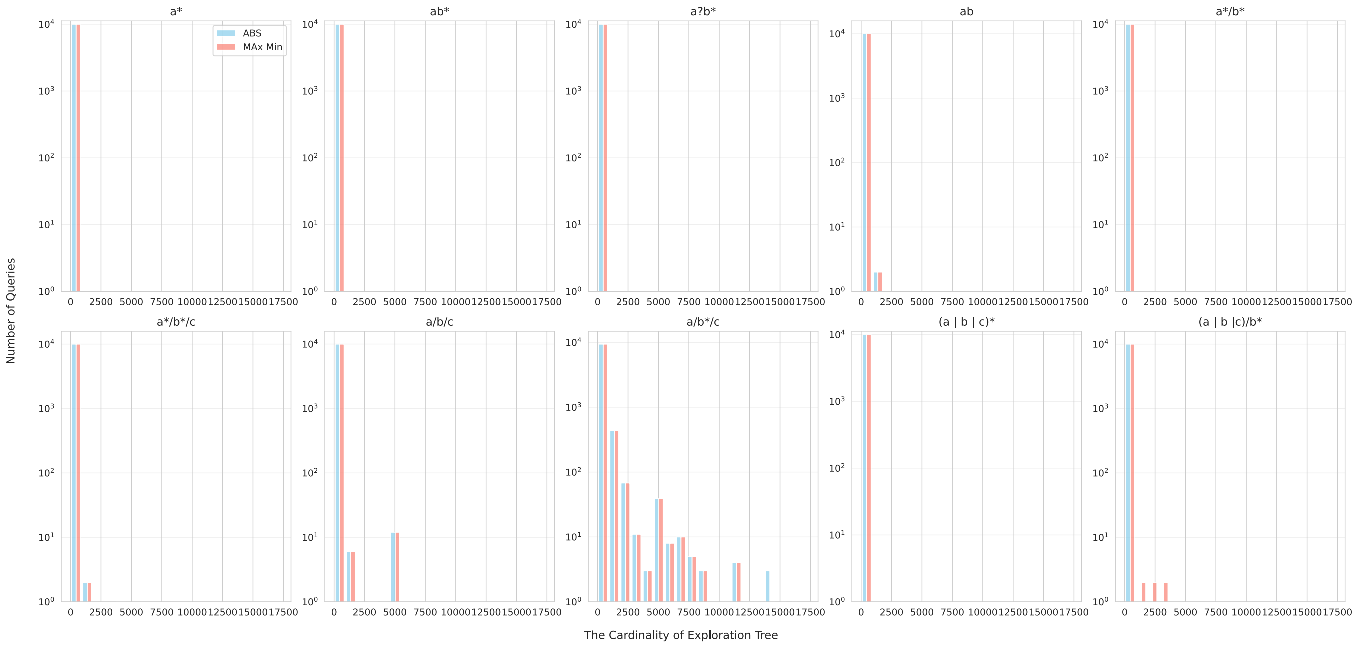
# Alternative Metric: The Cardinality of the Exploration Tree

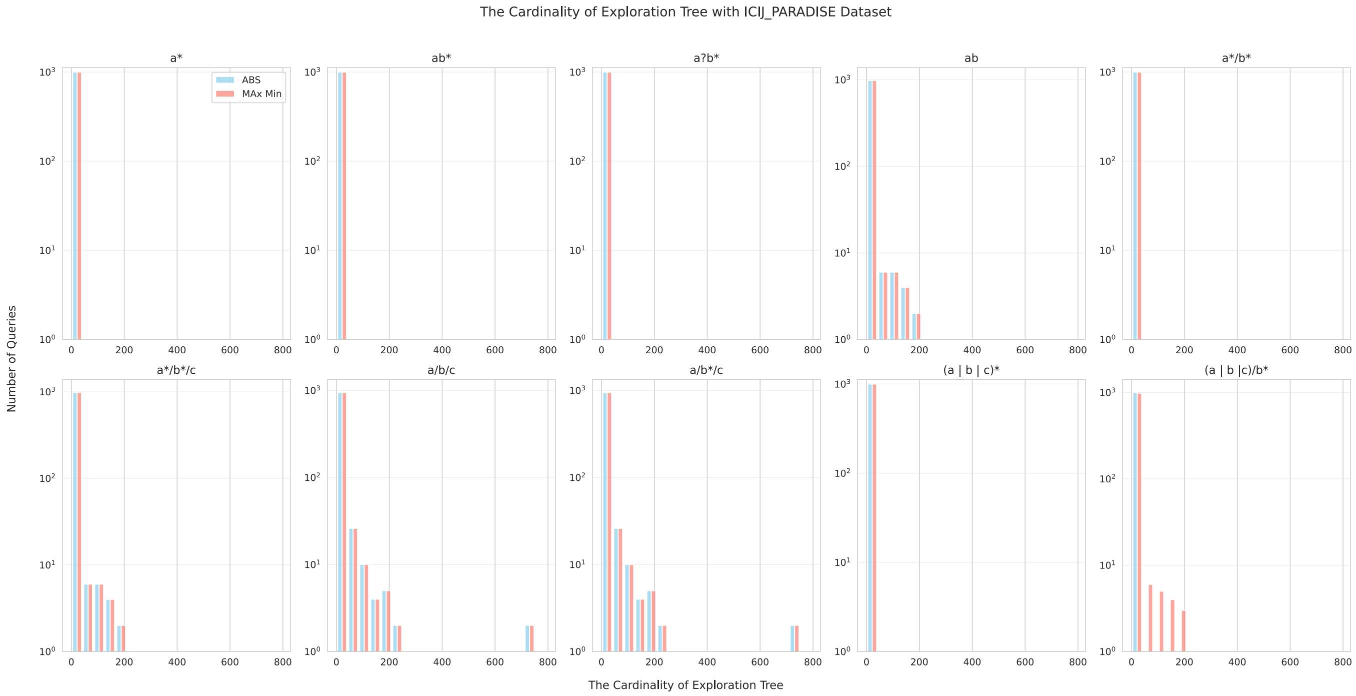
The following bar figures present tha stata of exploration tree cardinalities of each regular expression with different data constraint on each data set. The x-axis represent the cardinality of exploration tree, and the y-axis represent the number of queries. I also use logarithm coordinate for the y-axis.

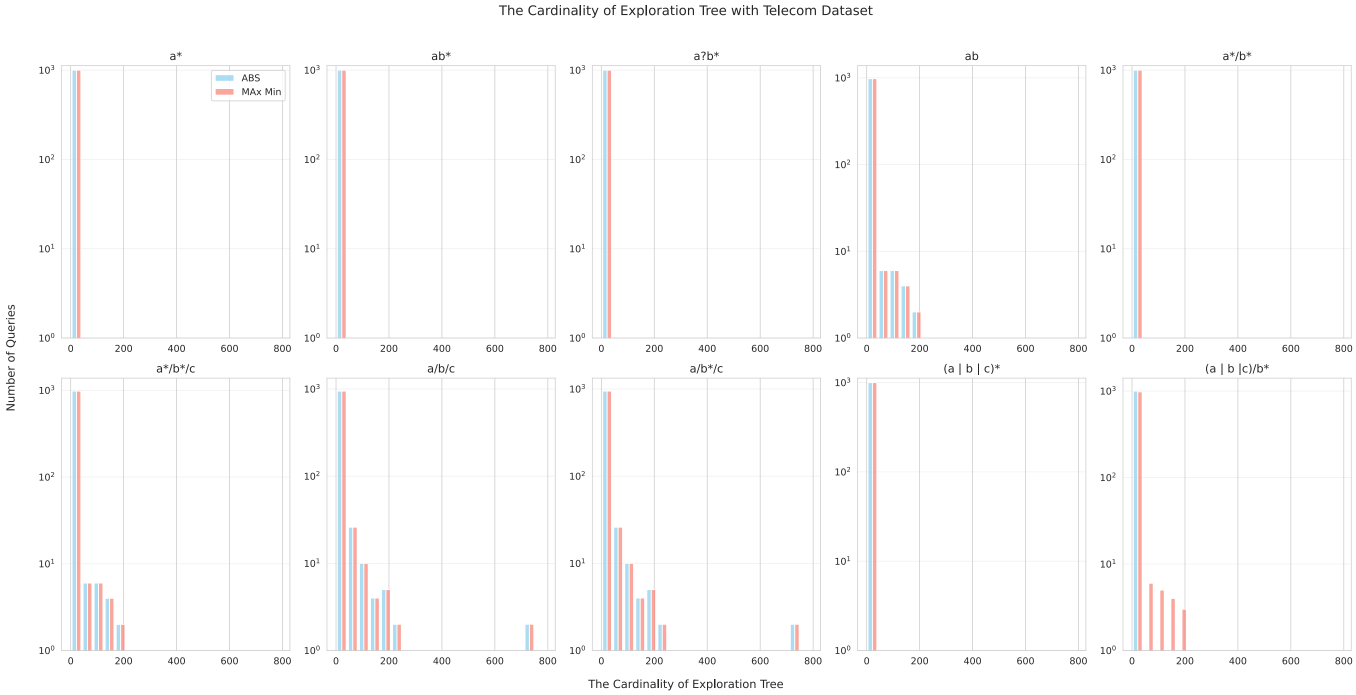
The Cardinality of Exploration Tree with ICIJ_LEAK Dataset



The Cardinality of Exploration Tree with Pokec Dataset




The Cardinality of Exploration Tree with ICIJ_PARADISE Dataset
a*
ab*
a?b*
ab
a*/b*
a*/b*/c
a/b/c
a/b*/c
(a | b | c)*
(a | b |c)/b*
ABS
MAx Min
Number of Queries
The Cardinality of Exploration Tree
$10^0$
$10^1$
$10^2$
$10^3$
0
200
400
600
800


The Cardinality of Exploration Tree with Telecom Dataset
a*
ab*
a?b*
ab
a*/b*
a*/b*/c
a/b/c
a/b*/c
(a | b | c)*
(a | b |c)/b*
ABS
MAx Min
Number of Queries
The Cardinality of Exploration Tree
$10^0$
$10^1$
$10^2$
$10^3$
0
200
400
600
800