CS 7260 – INTERNET ARCHITECTURE AND PROTOCOLS

Scribe for 09/17/2012 by Harshal Chaudhari

1. Grid of tries with switch pointers:

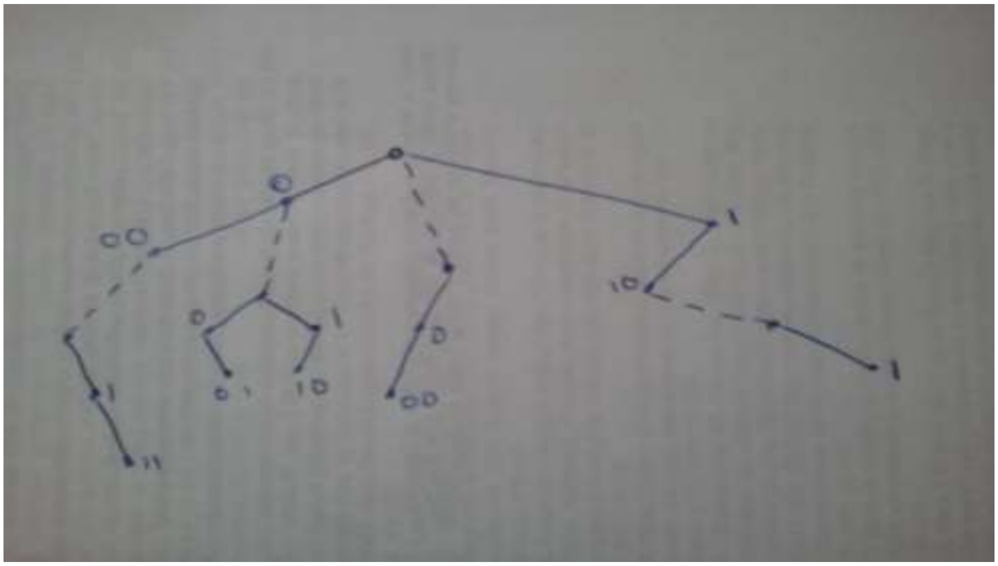

Figure 1.Grid of tries without switching pointers

- Previously we have seen 2 naive packet classification algorithms and then best scheme of packet classification in the end. It is called “Grid Tries with switch pointers”. To study the scheme lets first have a look at following points.
- What Are switch pointers? What is procedure to generate switch pointers?
- Switch pointers allows you to walk between different source tries without backtracking of destination tries.
- How to add switch pointers to existing group of ties structure?
- Procedure is not important but one have to go through each and every source trie.
- Algorithm can be explained somewhat like this:

```
For each(src)
        For each(missing edge)
        Search for its “Attachment point”
```

```
Let α be parent node of the src trie
        Then
                Search the src trie pointed to by the parent of α first
                Then grand father , great grand father…
```

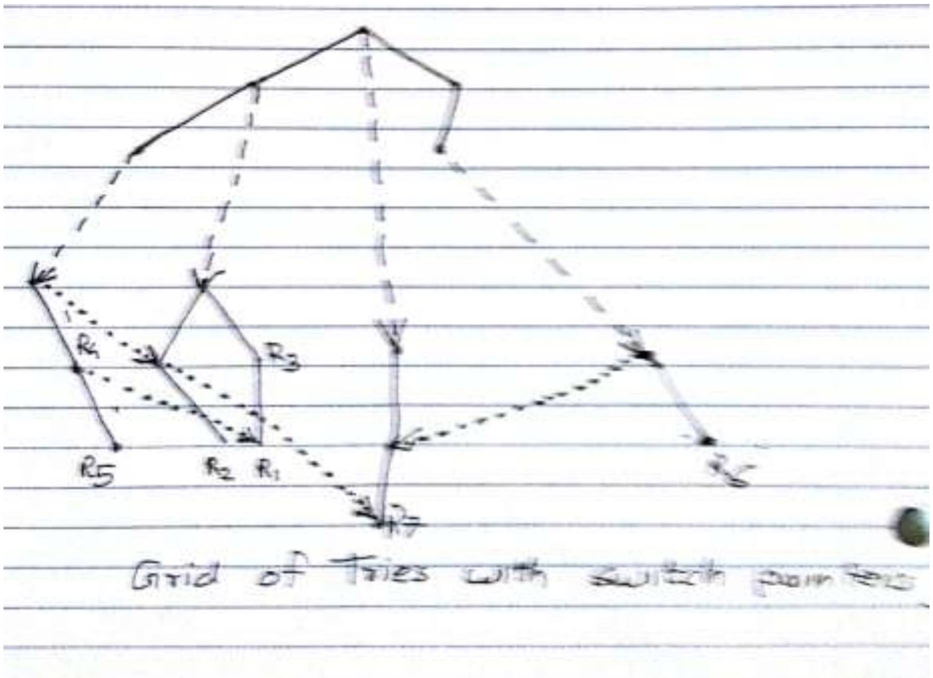

Figure 2 : Grid of tries with switch pointers

As you can see order in which nodes are accessed does not matter.

Note: Also it is allowed for a node and father node to point to same node in grand father nodes source trie.

In the given nodes ,R1 has highest priority while R7 has lowest priority. Dotted lines represent switch pointer.

Lets check if given IP packet *<src IP, Destination IP>*
can we guarantee, it will visit each and every rule that match this source destination pair.

e.g. Let Destination be 000 and source be 10…
By given algorithm traversal would be R4, R1. But there is another match if you look at example which is R3, R1.R3 corresponds to 0* and 1* which is there in source and destination. In this case R1 does have high priority than R3. But this may not be the case all the time.

So this algorithm traverses through only subset of all possible rules.

One solution for this situation is at every node one should store best matching rule , that match corresponding source and destination IP prefix.
At every trie node , one should store the best matching rule among all that match the corresponding source destination prefix pair.

Correctness of Grid of tries with switch pointers:

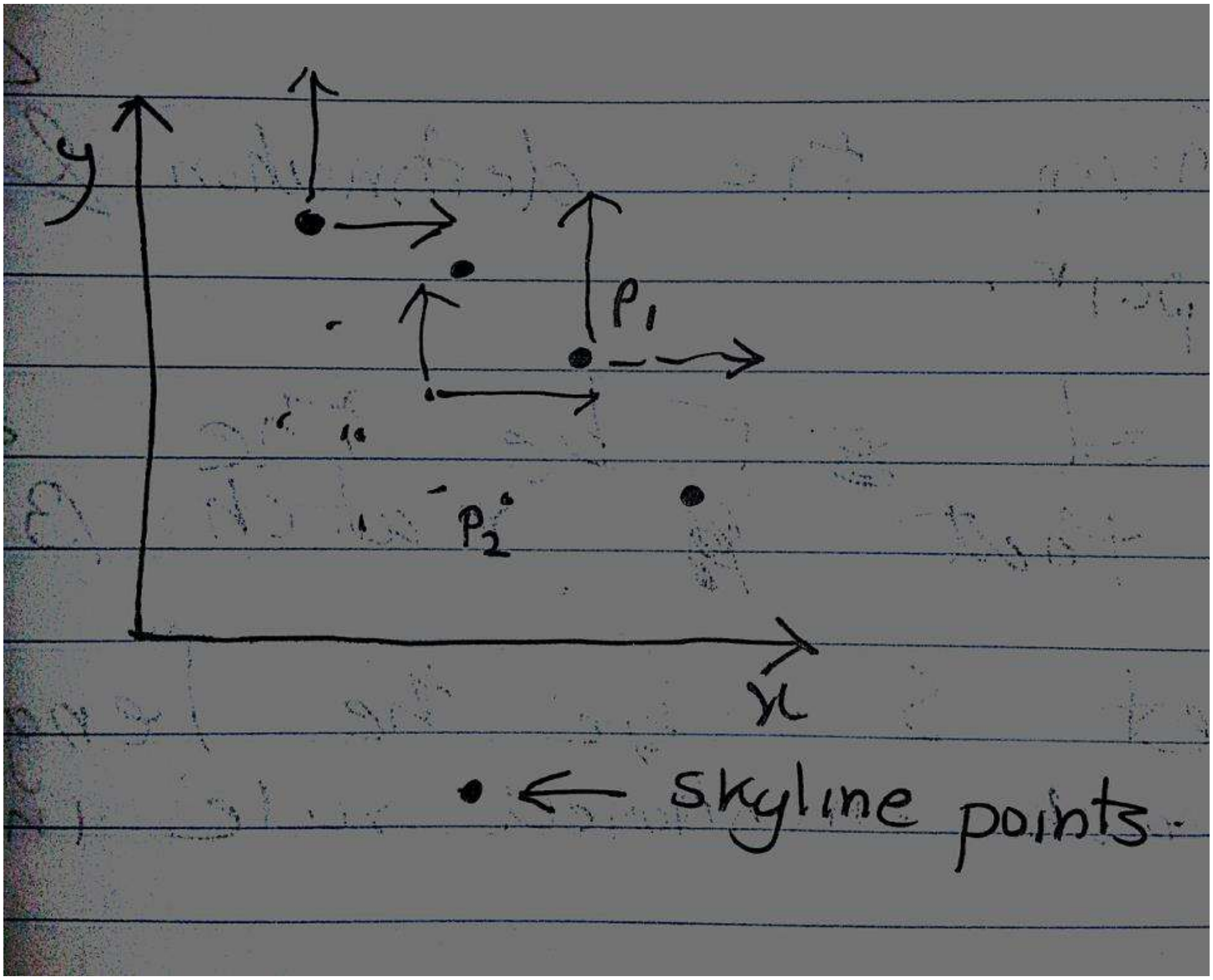

Figure 3: Graphical representation of Skyline points.

Algorithm travels through only skyline points.

Point P1(x1,y1) is said to be dominating point P2(x2 , y2)

if x1 >x2 and y1>y2 .

What are skyline points?

Given a set of points S we say that P is a skyline point in S if it is dominated by any other point in S.

So to imagine this in our algorithm we can consider length vectors of rules. Given the destination and source address pair, β= <dest, src> ,

Let T be the set of rules that match β.

Let S be the length vector of each mentioned rule in T.

<00* , 11*> →<2,2> -- corresponding length vector(which is equal to length of rule).

Theorem: the algorithm guarantees to traverse each and every skyline point.

Fact: At every skyline point store the best mentioned rule among itself and all that are dominated by it.