

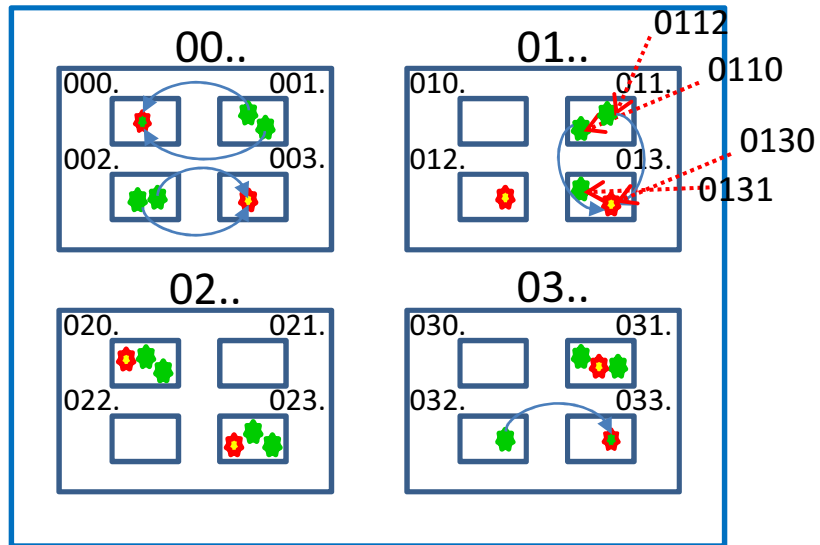
***LECTURE 3:* ARCHITECTURES: SUPPLEMENTARY SLIDES ON PLAXTON ROUTING**

Plaxton Routing

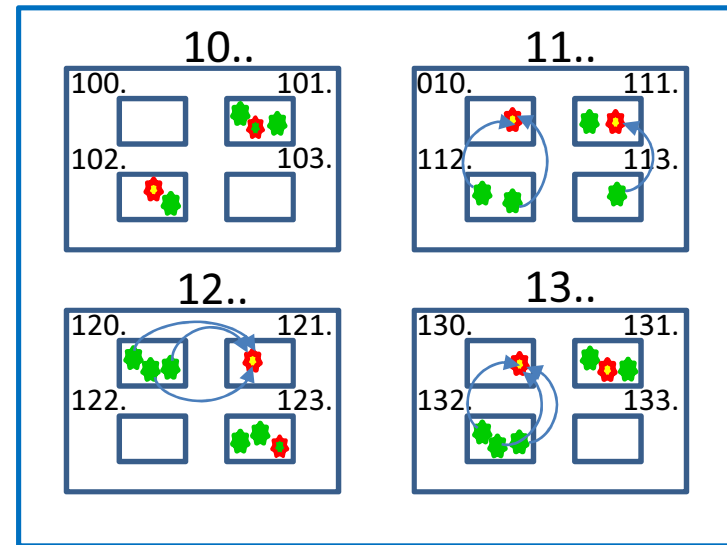
- Plaxton, Rajamaran and Richa: mechanism for efficient dissemination of objects in a network, published in 1997
 - Before P2P systems came about!
- *Basic idea*: prefix-oriented routing (assume fixed no. of nodes)
 - Store object ID= A at node with ID of longest common prefix with A
 - If many such nodes exist, choose node with longest common suffix
 - Goal: uniform data dissemination
 - Routing based on *pointer list* (object – node mapping) and *neighbour list* (primary + secondary neighbours)
- Basis for well-known DHTs *Pastry, etc* (and follow-up projects)
 - Method adapted to needs of P2P systems + simplified

Pastry Example

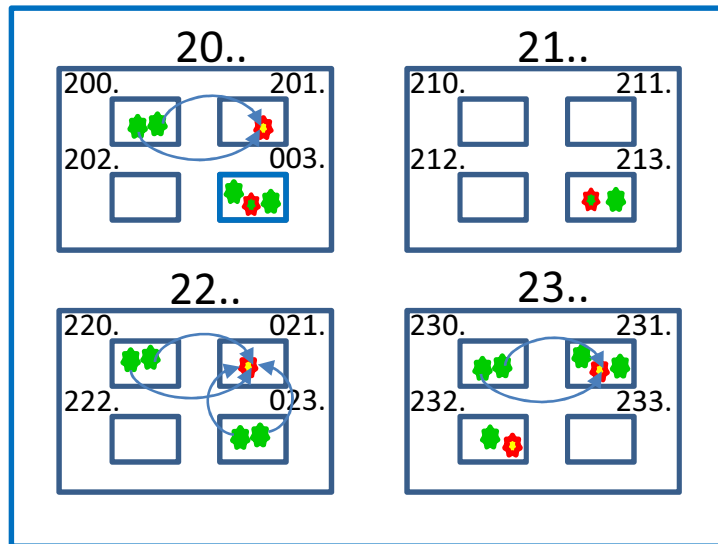
0...



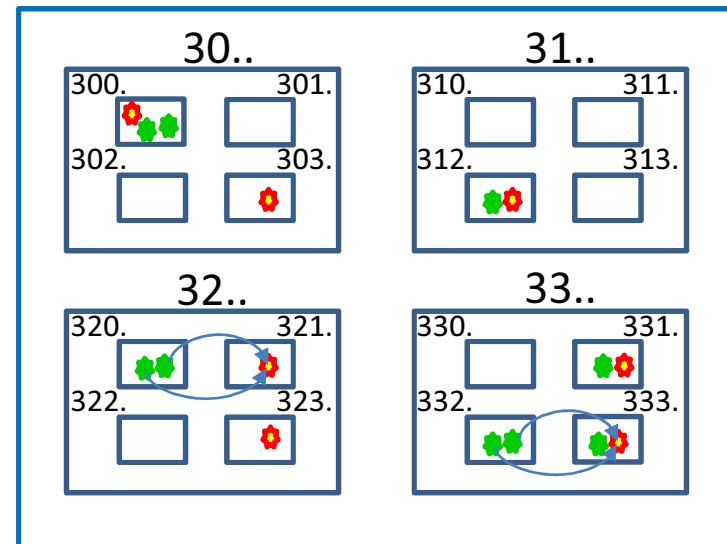
1...



2...

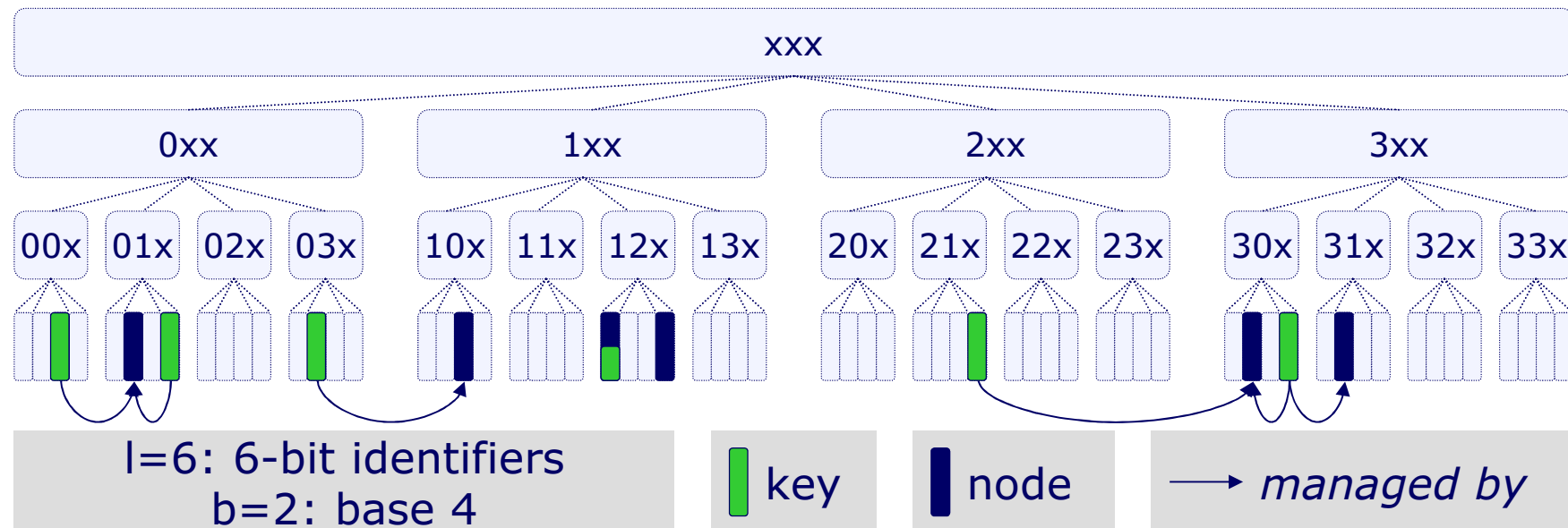


3...



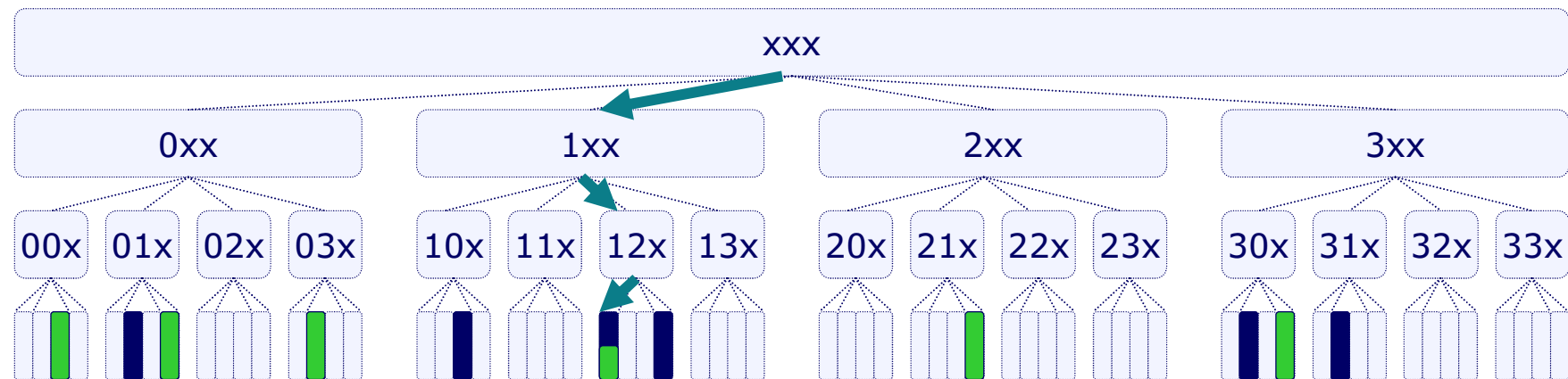
Pastry: Topology

- *Identifier space:*
 - 2^l -bit identifiers (typically: $l = 128$), wrap-around at $2^l - 1 \leftrightarrow 0$
 - Interpret identifiers to the base of 2^b (typically: $b = 4$, base 16)
 - Prefix-based tree topology
 - Leaves: *keys & node IDs*; (key, value) pairs under numerically closest node



Pastry: Routing Basics

- *Example*
- Goal: find node responsible for k , e.g. 120
- Tree-based search for lookup(k)
 - Traverse tree search structure top-down
- Prefix-based routing for lookup(k)
 - Approximate tree search in distributed scenario
 - Forward query to known node with longest prefix matching k



Pastry: Routing Basics (/2)

- *Routing in Pastry:*

- Each step, route towards “numerically” closest node
 - That is, query is routed to a node with a one character longer prefix (= b Bits)
 - $O(\log_{2^b} N)$ routing steps
- If that is not possible:
 - Route towards node numerically closer to ID

Destination: 012321
($b = 2$)

Start 321321



1. Hop

2. Hop

3. Hop

4. Hop

5. Hop

Destination:

Pastry: Routing Table

- *Routing table*

- Long distance links to other prefix realms
- l/b rows: one per prefix length
- $2^b - 1$ columns: 1 per digit different from local node ID

– Routing table for node 120:

?xx:	011	1	-	301
1?x:	102	-	2	-
12?:	0	-	-	123

