

Searching in a Web-based Infrastructure for Smart Things

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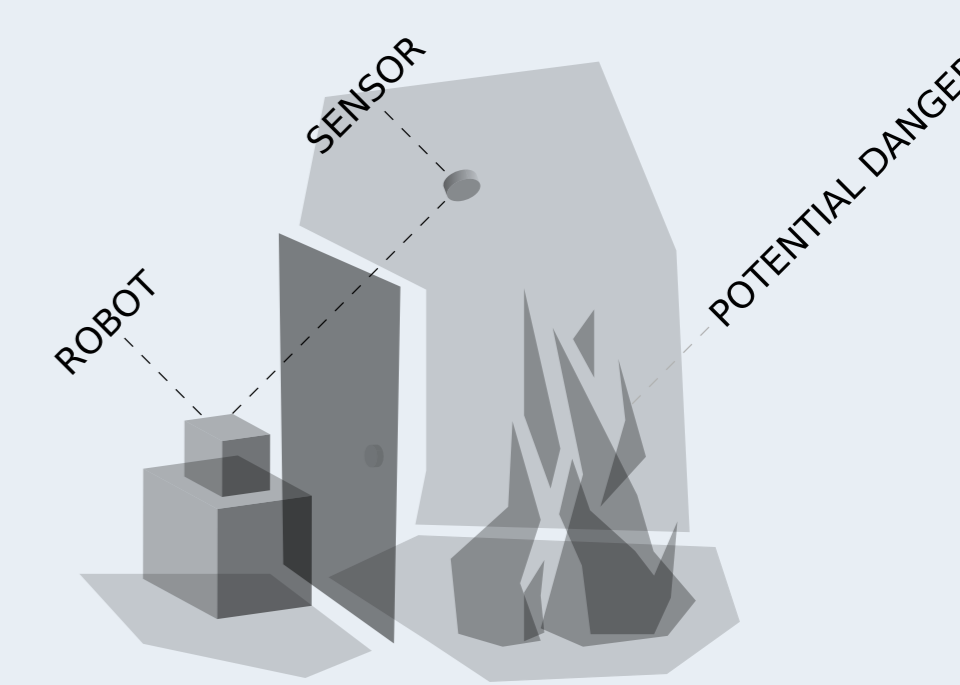
Goal: Interconnection of services offered by smart things in everyday environments

Web of Things: Web technologies for application-layer interoperability of smart things

Thing + Internet connection³ + embedded Web server + resource-oriented modeling + REST¹

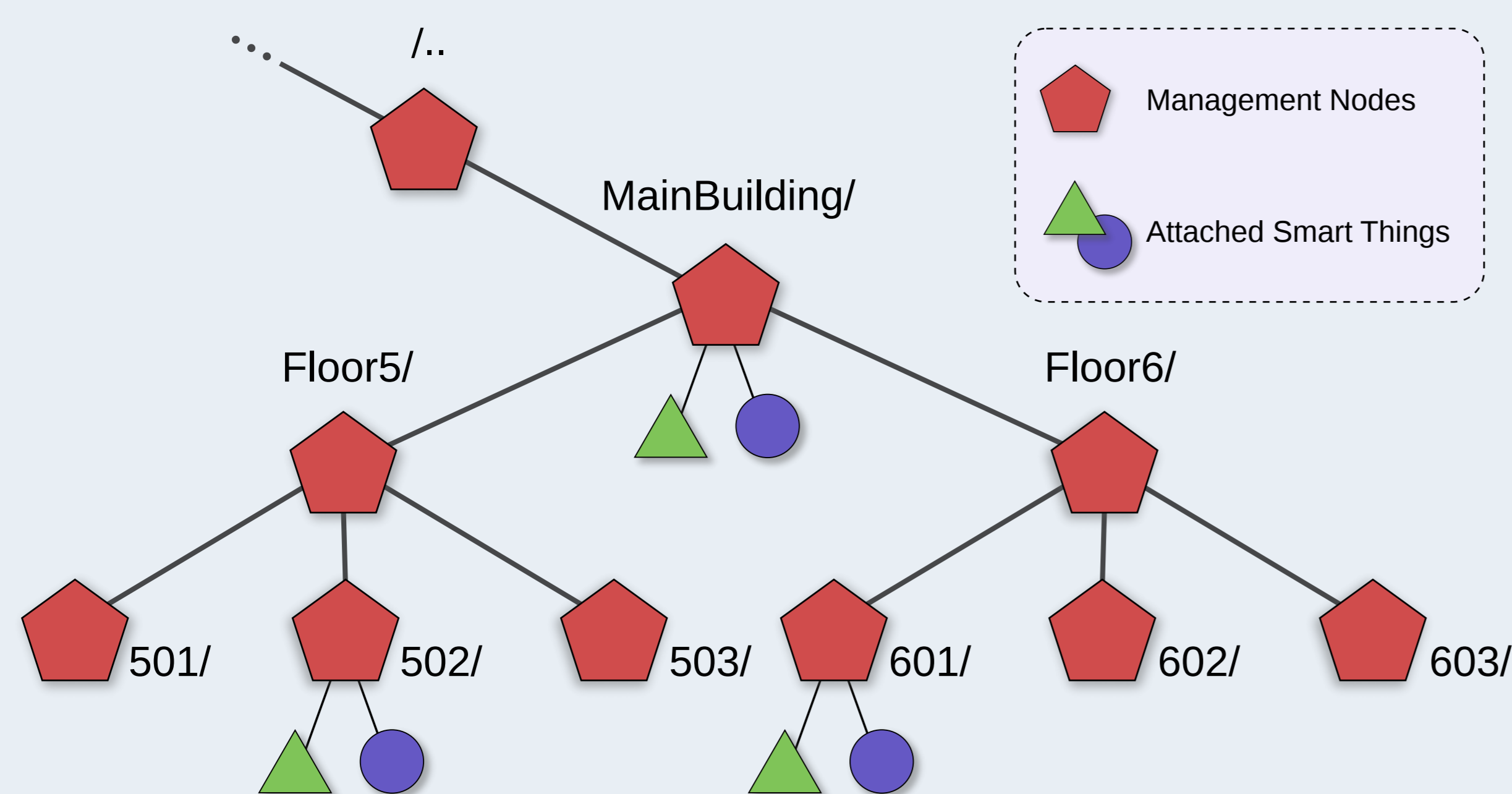
A Web-based Infrastructure for Smart Things

- Support **discovery**, **selection**, and **usage** of services offered by smart things
- Desired Properties: Scalability, Load-balancing, Self-management, User-friendliness
- Example applications: User interfaces, body sensor networks, robotic devices,...



Infrastructure Properties

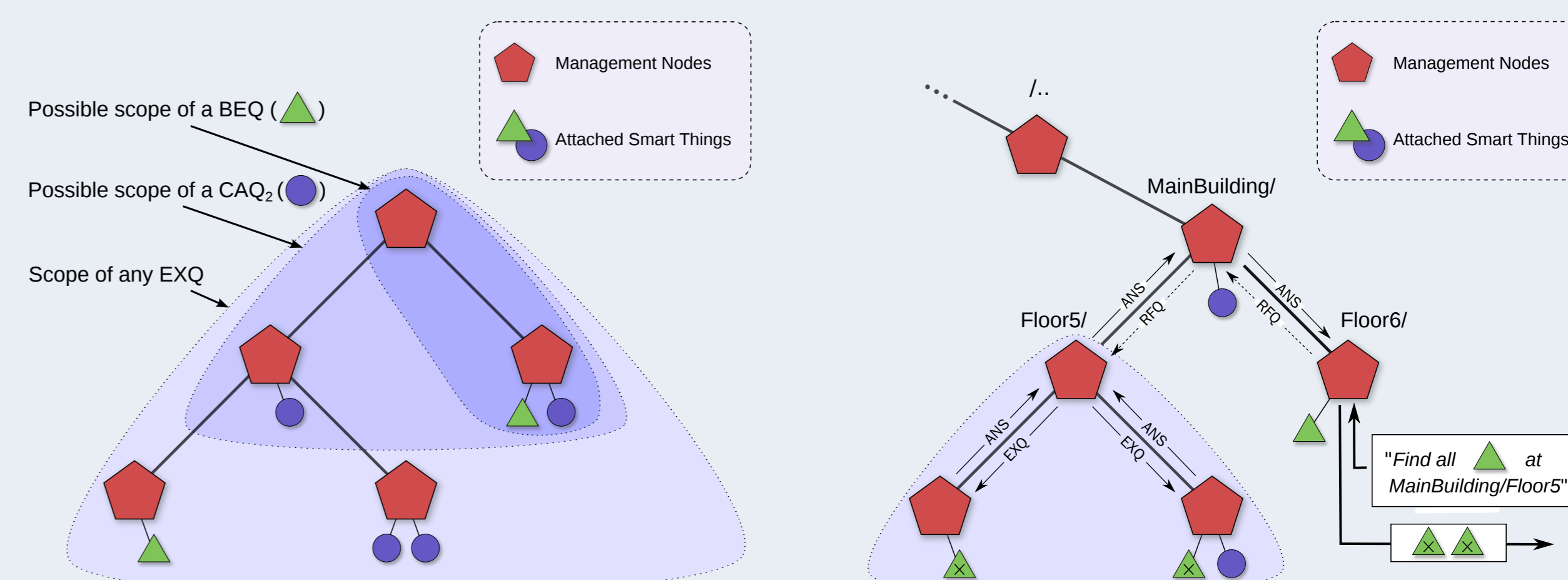
- Hierarchical structure based on **logical place identifiers** to exploit the locality of thing interactions!



- Self-management:
 - ✓ **Self-stabilization algorithms** arrange nodes according to the topology induced by logical place identifiers
 - ✓ Ability to **recover from temporary node failures**, eventually re-establishing the original structural configuration

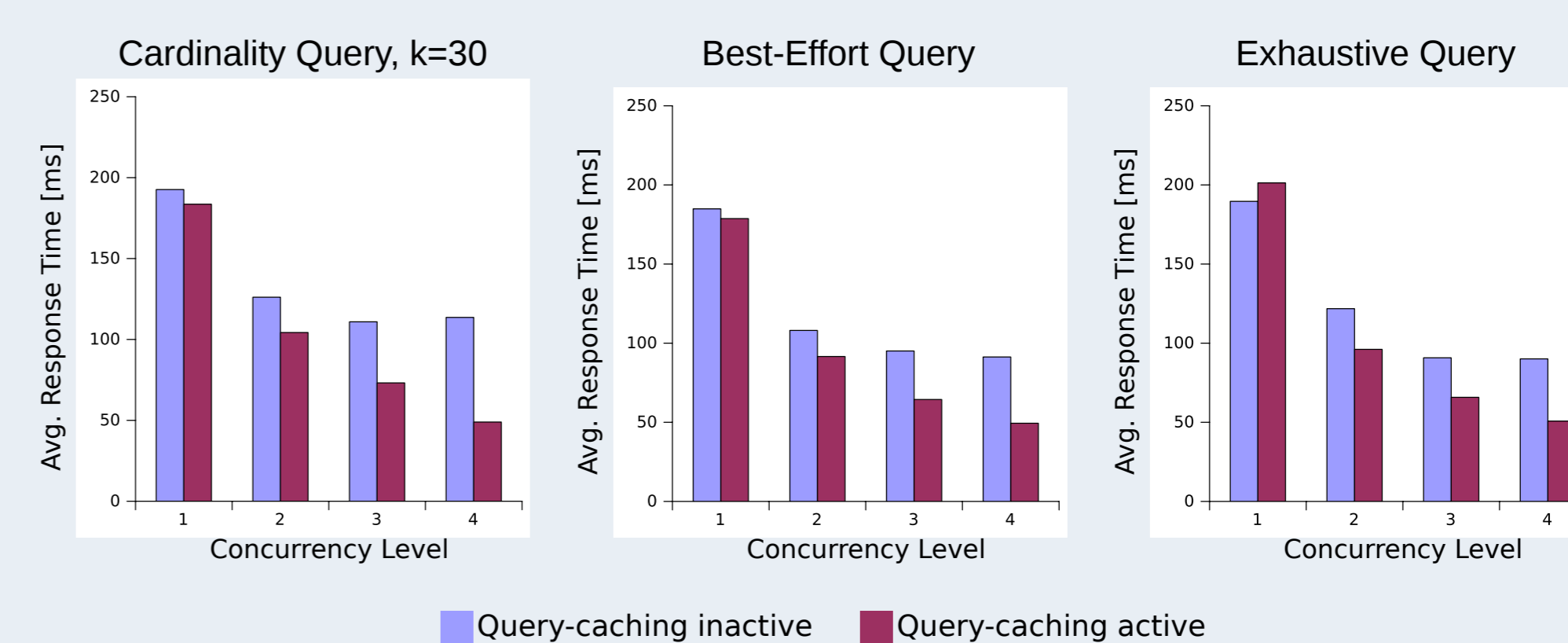
Searching for Smart Things

- Multiple query types for different scopes
- **Request-for-Query** to enable searching outside the scope of the current authoritative node



- Resource-oriented view on querying and query routing

Setup: 600 sensors distributed uniformly among 6 "office-level" nodes within a hierarchy of 9 nodes (cf. Hierarchy on the left)



Conclusions

Application of REST patterns in the design of an Internet of Things infrastructure

- ✓ Register services as **resources** (resource-oriented architecture)
- ✓ **Annotate** these resources to enable their **automated discovery**⁶
- ✓ Benefits: Scalability, interoperable APIs,...

Next steps

- Find smart things' locations w.r.t. management nodes: Integrate with **relative** indoor localization system!
- Enable targeted searching for machine clients: Integrate **semantics** in device and service descriptions!

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