The Internet of Things (IoT) consists of collaborating microservices (μSs). Some services offer interfaces to manage entities, others implement orchestration logic, yet others interface users. Dynamic binding of services is fundamental to enable portability and adaptivity of μSs to their local (service) context. The central challenge of service composition is service discovery. Service discovery has been investigated a lot in the past. However, the focus was on low ISO/OSI layer technologies such as UPNP or Bonjour. Implementing the IoT as a Service-Oriented Architecture (SOA) of μSs requires a significantly more feature rich discovery on the application layer. A major challenge here is that the IoT is more heterogeneous and dynamic than classic IT SOA systems. The IoT therefore requires a novel service discovery. We present a semantically rich yet simple to use IoT service discovery mechanism. It consists of distributed so-called search providers that implement semantic directories, and a federation mechanism that allows mapping complex search queries to simple search provider modules. Our approach reflects the heterogeneity of managed entities, and the dynamic adaptivity required to reflect the continuous changes of IoT spaces. We evaluate our solution qualitatively with a user study and quantitatively via latency measurements.
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