Namespaces, Security, and Network Addresses

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Namespaces and Network Addressing
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- Application development - microservice is unit of
  - Code development (especially to the ‘agile agenda’)
  - Service abstraction
  - Heterogeneity of development/runtime environments
  - Integration (eg the modules of a CI/CD pipeline)
  - Distribution
  - Interaction with networking

- Routing and addressing
  - Microservice is networking end-point
  - Extensive use of networking ‘extensions’
    - Secure tunnelling
    - Private addressing
    - NAT/PAT
    - Load balancers/firewalls/sidecars
  - Extensive use of management tools – loosely ‘orchestration’
    - Creation of secure tunnels
    - Creation of private networks
    - Management of DNS
    - Address allocation, domain name allocation
1. Linkage Between – Application Development and ‘Orchestration’

- Application can support direct call to function without prior reference to distribution
- Mapping of function to addressing is done by transparently by compiler/linker/orchestrator
2. Layering by Observation

Application namespaces

Network addressing

Wide Area Network

Compute infrastructure

Component A module
Component B module
Component C module
Component D module

Sidecar

Virtual switch (shared memory)

REST (http header + IP header)

Application namespace

IP DA (private or public)

IP header 5-tuple (NAT)

IP DA (public)

Proxy/Load-balancer

Networking interface

Networking interface

Component D module
3. Extensible Private Addressing

• Easy and secure mapping from application namespace to private address
• Private networking adds to security
• Private addressing can be dynamically pre-fixed into a wider context
• Embraces many ‘extensions’ in use today
• Easy integration with fieldbus networking
• *Private addressing should be taken as the norm not the exception*
https://piccolo-project.org/