draft-pentikousis-nmrg-andr-00

Autonomic Networking Definitions Revisited
CNSM2014 - NMRG 35th

Outline

Introduction

Definitions

Operational Considerations and Outlook

Security Considerations

Introduction

- IRTF Network Management Research Group (NMRG) and Autonomic Networking (AN)→3 meetings + ANIMA creation
- Focus of several research projects over the last decade
  - AN Architecture (ANA), Unified Management Framework (UMF), Generic ANA (GANA)
- Recent related efforts in the IETF/IRTF
  - I2RS, SFC, ABNO, SUPA, LIME, SDNRG, NFVRG
- Set of definitions for AN
  - E.g., self-CHOP

Introduction

- NMRG docs
  - Set of design goals and non-goals for AN [irtf-nmrg-autonomic-network-definitions]
  - Model reference architecture [behringer-autonomic-control-plane]
- Standardization ⟶open question and deployment limited to specific mechanisms [irtf-nmrg-an-gap-analysis]
- Most of the work in IETF: autonomic behaviour at the node level [irtf-nmrg-autonomic-network-definitions]
- Reconsideration of node-level autonomicity only

Definitions

- Autonomicity at the system level, not at the node level
  - E.g., Autonomic System (AS) definition [1]:
    - "*An AS is a system that operates ... managing its own self without external intervention*"
- Minimum set of properties that an AS should possess
  - Automatic, i.e. it can "self-control its internal functions and operations"
  - Adaptive, i.e. it can change its "configuration, state and functions"
  - Aware, i.e. it can "monitor its operational context"

1- Schmid, S., Sifalakis, M., and D. Hutchison (2006) *Towards autonomic networks*. Proc. Autonomic Networking, LNCS 4195, pp. 1-11. Springer

Types of Managed Components

- 3 types of managed components depending on their autonomic capabilities [1]
  - Autonomically-unaware,
    - Legacy equipment
    - Only manageable using traditional mechanisms
  - Autonomically-aware
    - Upgrades to support certain autonomic features
  - Autonomically-enabled
- Autonomic manager →orchestration of system behaviour

1 - Strassner, J., Agoulmine, N., and E. Lehtihet (2006) *FOCALE: A novel autonomic networking architecture*. Proc. Latin American Autonomic Computing Symposium (LAACS), Brazil

AN Control Loop

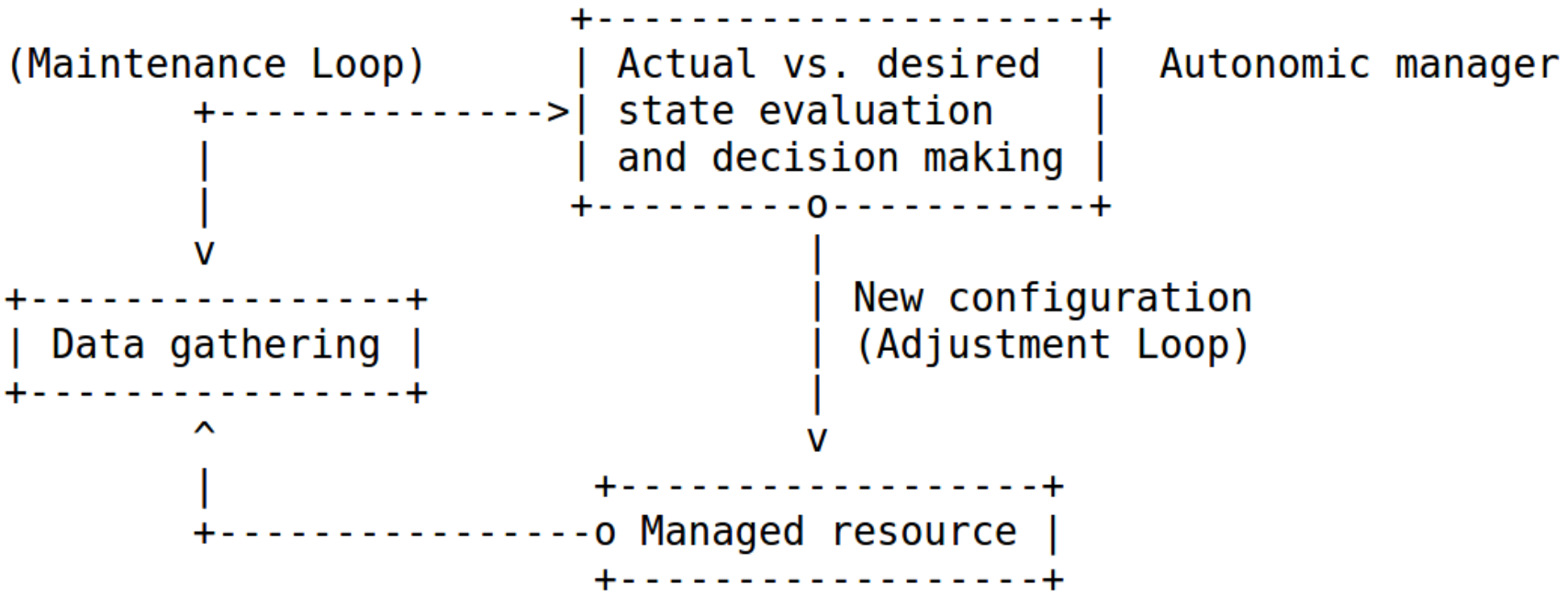

Figure 1: Simple sketch of an autonomic networking control loop

1 - Strassner, J., Agoulmine, N., and E. Lehtihet (2006) *FOCALE: A novel autonomic networking architecture*. Proc. Latin American Autonomic Computing Symposium (LAACS), Brazil

Operational Considerations and Outlook - New Deployment Models

- Deployment of new network technologies typically a time-consuming and labour-intensive task
- New deployment models → AN principles may prove invaluable
  - ASs by design programmable
- AN definitions, goals and gap analysis within the context of IETF → more consideration
  - E.g., SUPA [I-D.pentikousis-supa-mapping] → infrastructures which are managed through intents

Operational Considerations and Outlook - Programmable Network Elements and Functions

- Development of some models related to AN research literature → lack of interactions
  - E.g., FoRCES [RFC5812]
- SDN and NFV principles in a wider audience of researchers and practitioners → fully programmable network elements and functions in AN architectures
- "Task-centric model" relates well with other efforts in IETF such as SFC [I-D.ietf-sfc-problem-statement]

Operational Considerations and Outlook - Autonomic Planes

- SDNRG → need for the wider SDN community to think in terms of control, management, and operational planes [I-D.irtf-sdnrg-layer-terminology]
- NMRG → focus on standardizing an AN control plane [I-D.behringer-autonomic-control-plane]
- A way forward → AN in NMRG in the context of programmable networks and through a more comprehensive manner

Security Considerations

- I-D not proposing a new network architecture or protocol → no impact on the security of the Internet
- AN introduces a range of opportunities for formal verification techniques which could increase trustworthiness → initially out of scope

Thank you.

Questions?