PIACERE Integrated Development Environment

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PIACERE Project

Vision: DevSecOps framework for the development, deployment and operation of trustworthy infrastructure-as-code.

Goal: Framework with tools integrated in the IDE.

Status: PoC version already available!
The PIACERE Solution
- DOML – domain specific language
- Model checker
- IaC Optim. Platform + catalogue
- IaC Code Generator (Terraform, Ansible, ...)

- PIACERE runtime controller
- Canary sandbox environment
- IaC Execution manager

- IaC security inspector
- Component security inspector

(Security) monitoring
Self-learning
Self-healing
DevSecOps Modelling Language (DOML)

- End-user declarative language enabling the modelling of provisioning, deployment, and configuration of infrastructure
- Multi-layer approach. An application can be described in four layers: application layer, abstract infrastructure layer, concrete infrastructure layer and optimization layer.
- Extensible
- EMF based and using Xtext Framework
  - Enables DOMLX to facilitate integration with other technologies
DevSecOps Modelling Language (DOML)

doml amurica
properties {
  environment="prod"
  proyecto="amurica"
}

// Application Definition
application amurica {
  software_component Gestaut {
  // Interfaces should be separated by commas, but the IDE needs to be fixed
  provides [ http, https ]
  consumes [ dbAccess, search ]
  }
  software_component ElasticSearch {
  provides [ search ]
  consumes [ dbAccess ]
  }
  software_component Edi {
  provides [ edi ]
  consumes [ dbAccess ]
  }
  dbms postgres {
  provides [
    dbAccess
  ]
  }
}

infrastructure abstractInfra {
// Networks
  net vpc {
    cidr "10.100.0.0/16"
    protocol "TCP/IP"
    subnet subnet1 {
      ...
IDE (Integrated Development Environment)

- Enables end users to access all piacere tools (design time and runtime)
- Two main integration approach depending on the needs of the tools: context menus and custom views
- Additional elements added to facilitate user experience
  - Preferences
  - Perspectives
  - Project type
VT (Verification Tools)

- **DOML Model Checker**
  - Validate DOML models and verifying their consistency and correctness
  - It is a service
  - IDE communicates with it through a REST API, leveraging the DOMLX format
  - Powered by the Z3 Theorem Prover and built with Python

- **IaC Security Inspector**
  - After the design phase
  - Checks cover syntactic problems of the IaC languages
  - Checks IaC component and their dependencies
IOP (PIACERE Optimizer Infrastructure)

- find the optimum infrastructure to be deployed considering
  - The data provided as input
  - The infrastructure catalogue

- Objectives considered
  - Cost
  - Availability
  - Performance

- Different requirements possible
  - maximum cost for the overall configuration
  - a minimum performance
  - ...

- Relays on multiobjective algorithms NSGA
ICG (Infrastructural Code Generator)

- Translates DOML into IaC supporting currently terraform and ansible languages
Conclusion

• The motivation of the IDE was to
  • Facilitate the usage
  • Cover all phase in a single point
  • Increase the quality

• We have presented the Design time support of the IDE
  • There is a runtime support as well

• We are in the final tuning of the environment through the applications in three use cases
  • Transport
  • Government
  • Real time applications
Thank you!

www.piacere-project.org
Thank You

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