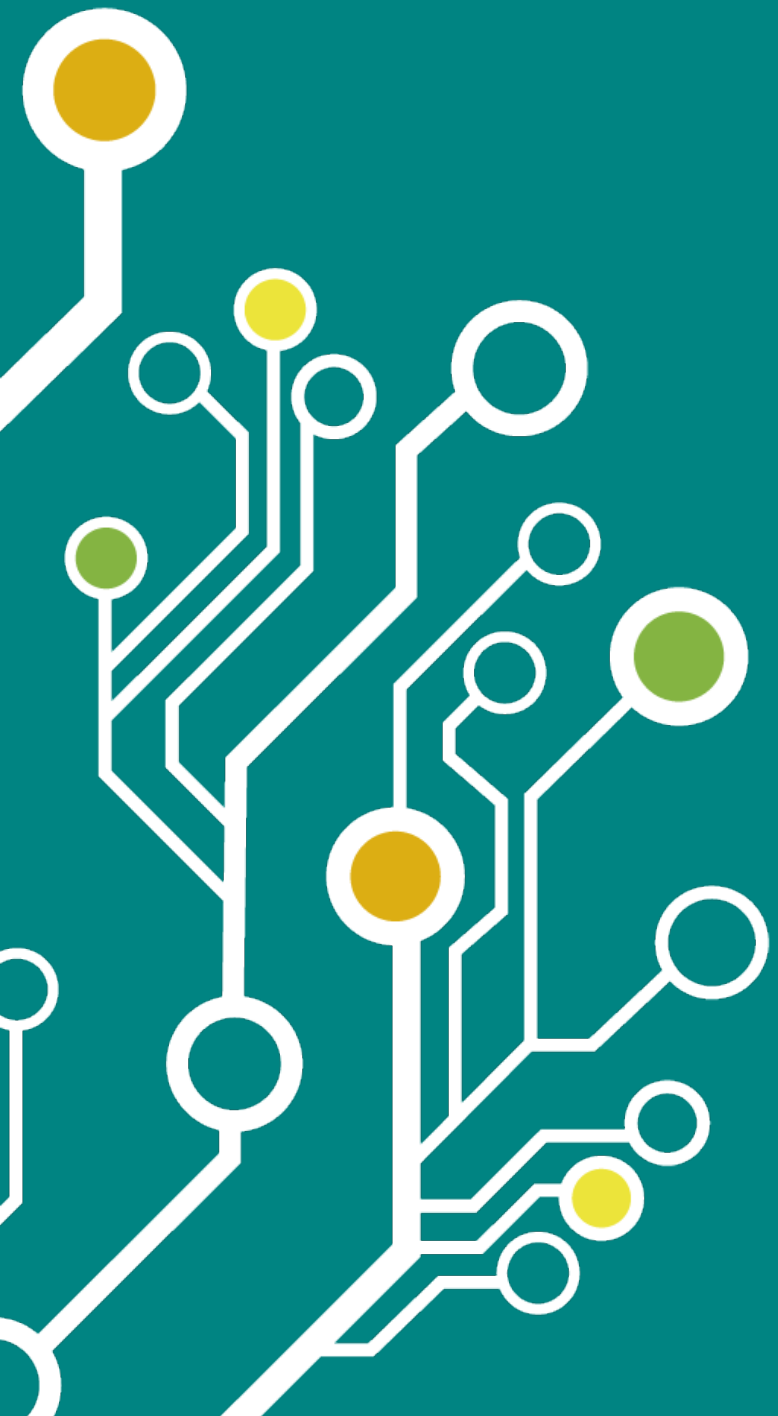
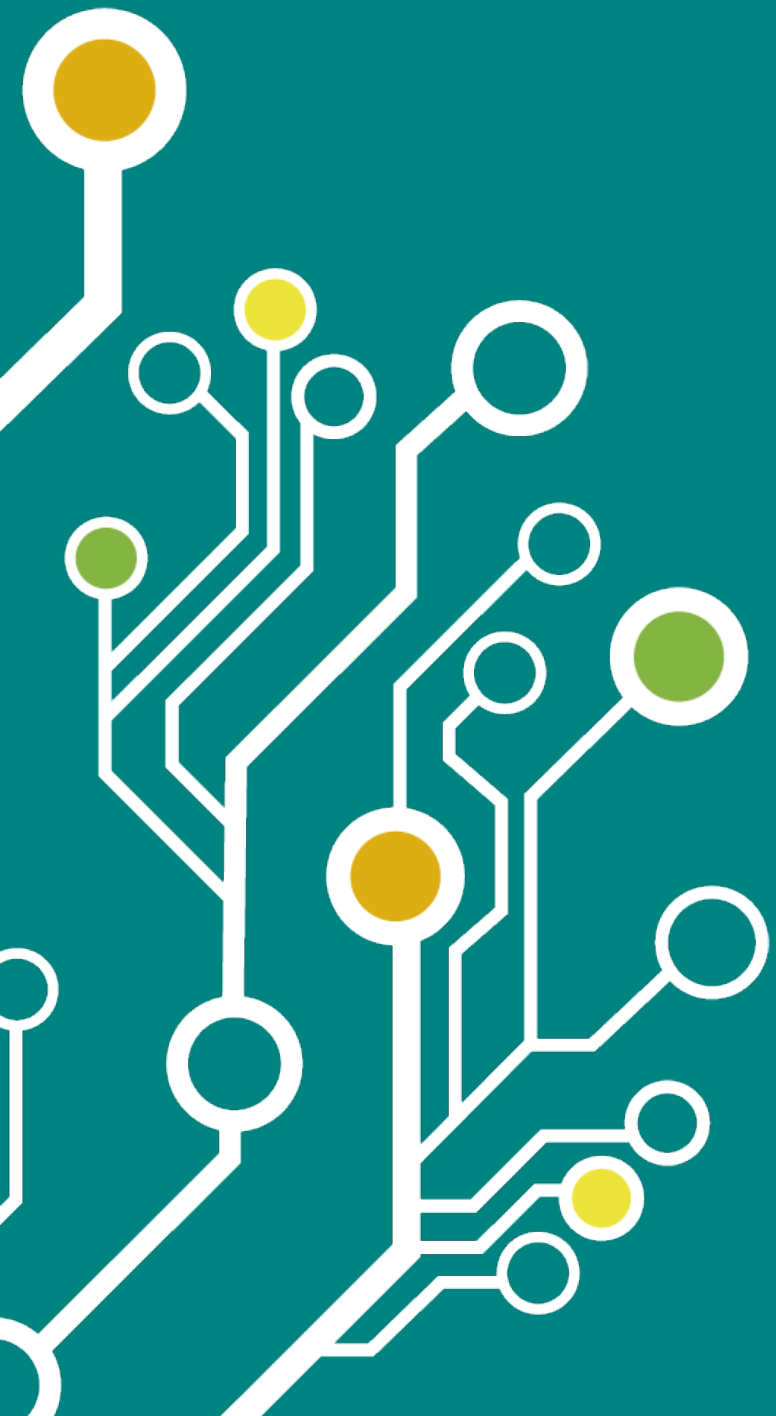


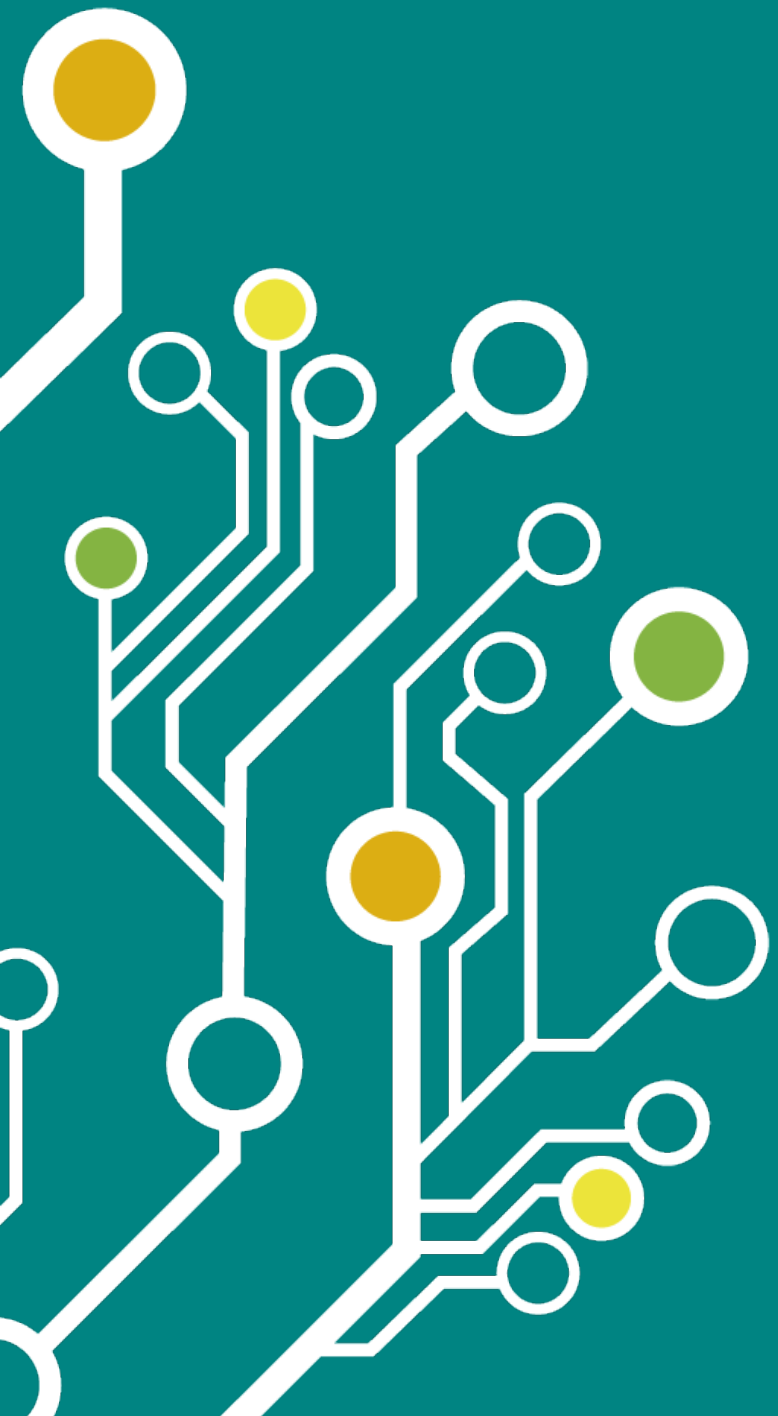
INSTITUTO TECNOLÓGICO VALE

VALE

Robot Operation System (ROS)

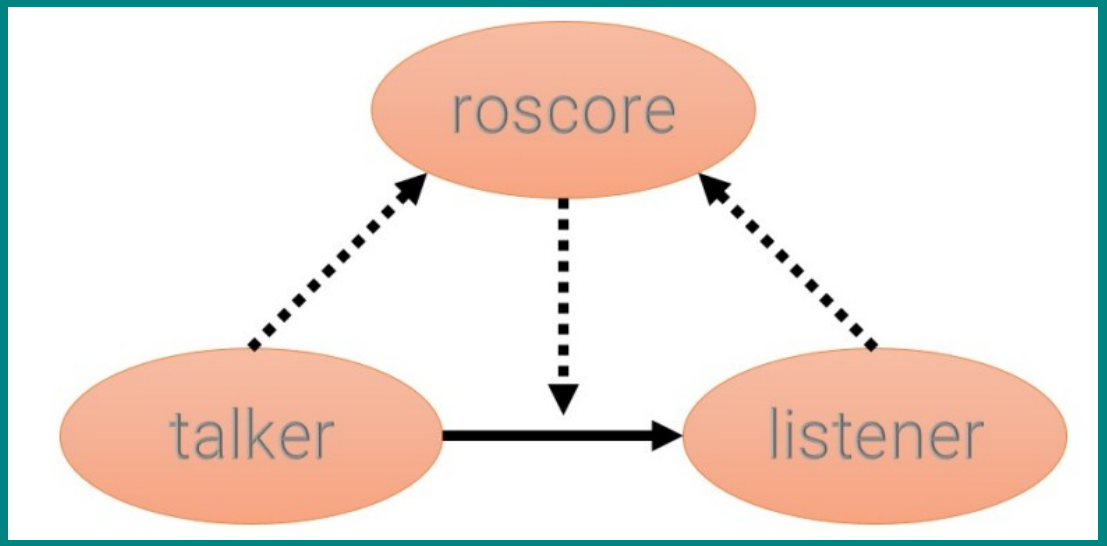


O ROS é um *framework* para desenvolvimento de softwares robóticos, que visa facilitar a criação de complexos e robustos comportamento de máquinas, provido de bibliotecas, ferramentas, simuladores, entre outros.

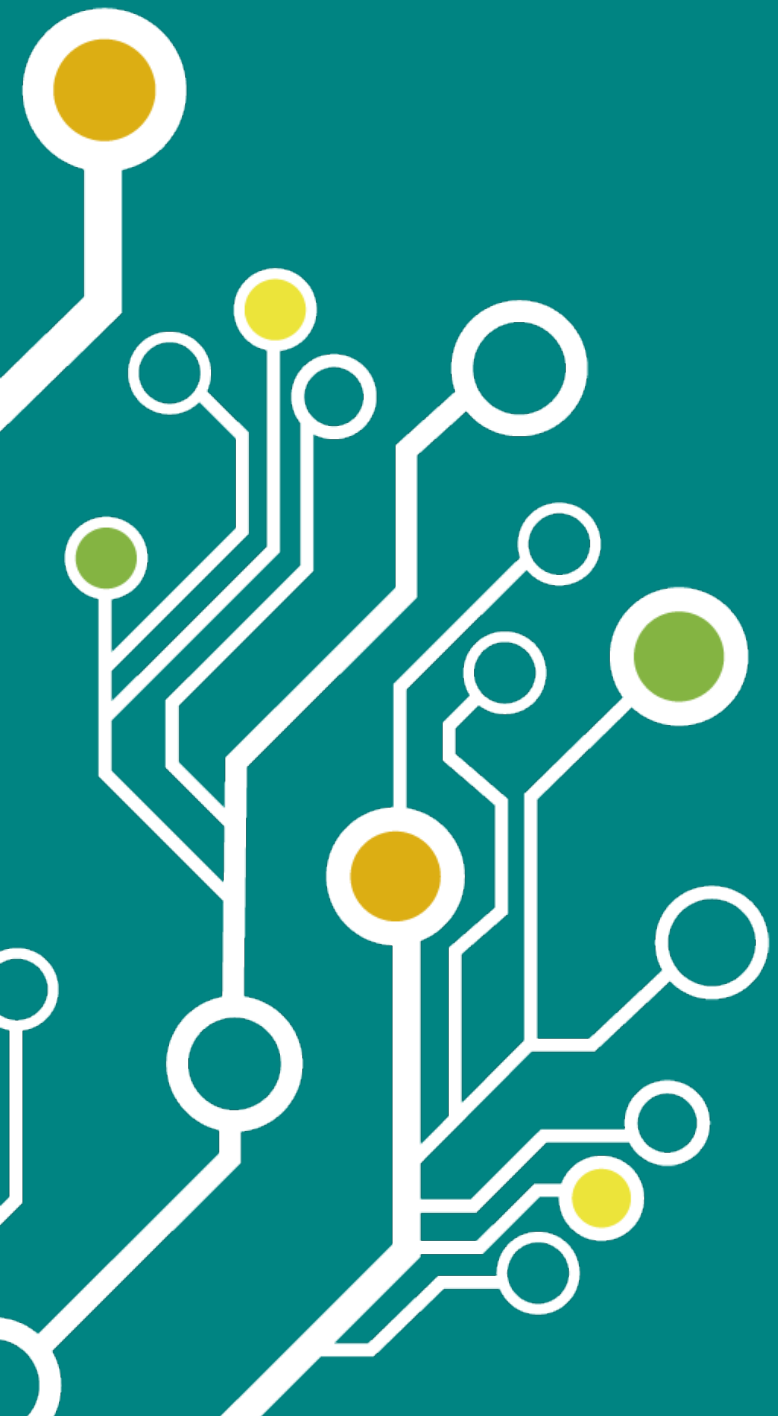


Permite a execução de vários programas e estabelece comunicações entre eles.

O núcleo do ROS é chamado de roscore, e é o primeiro programa que deve ser executado



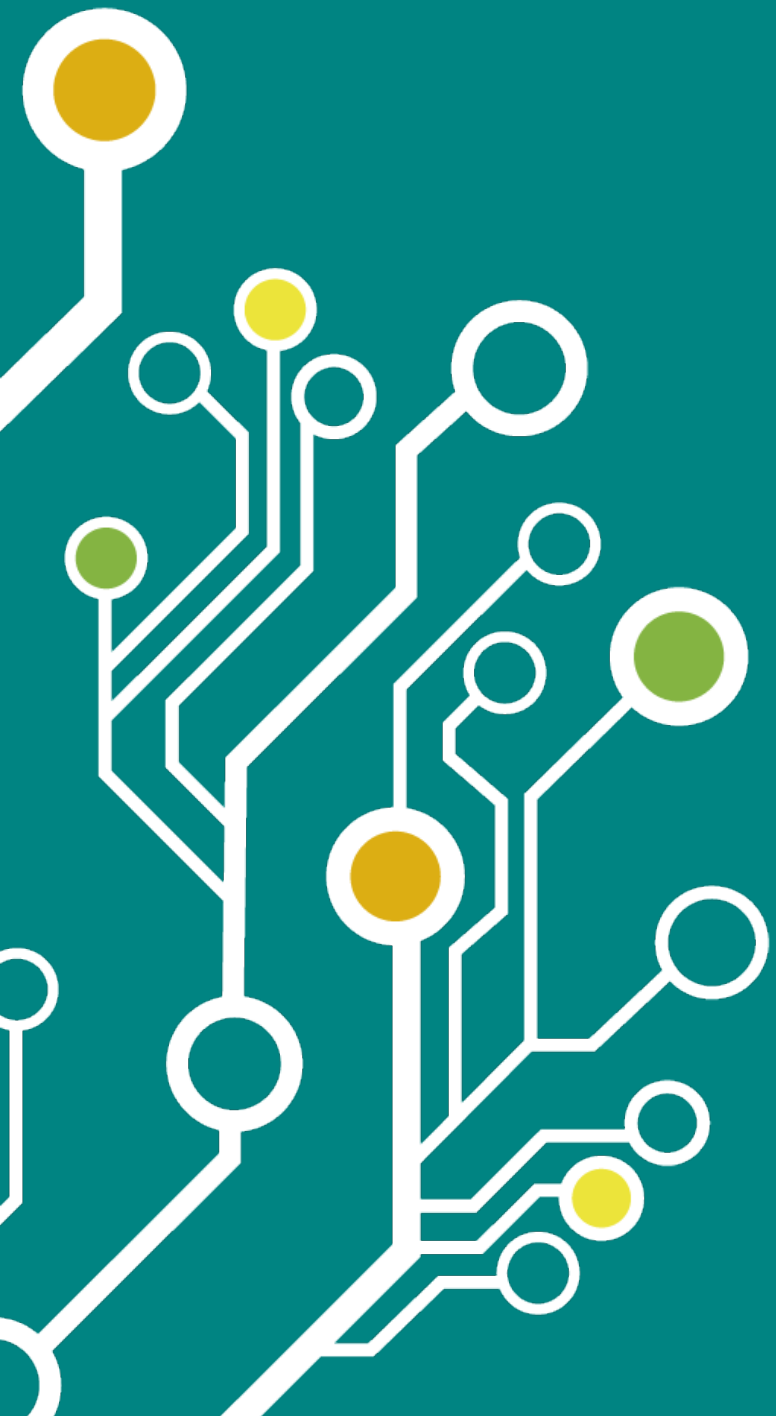
Grafo Esquemático



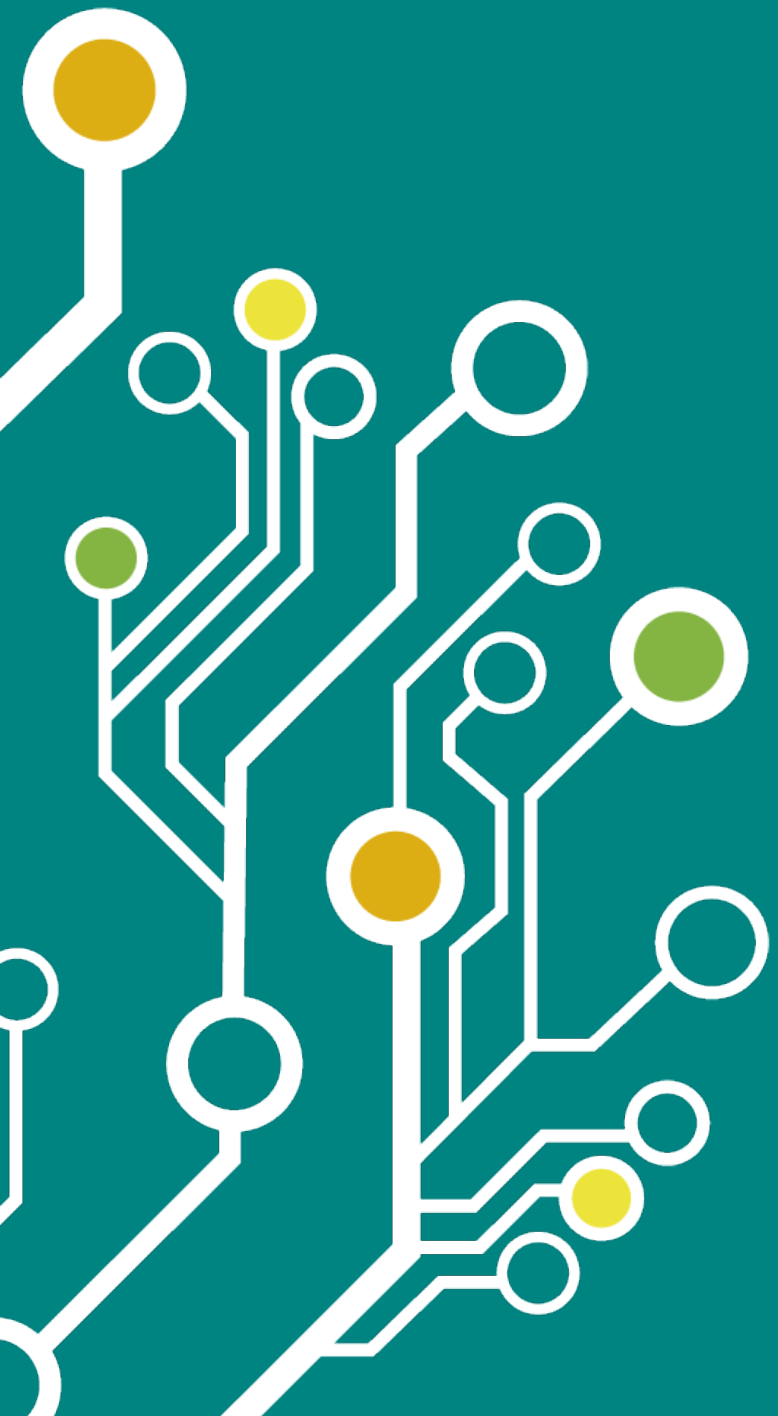
INSTITUTO TECNOLÓGICO VALE

VALE

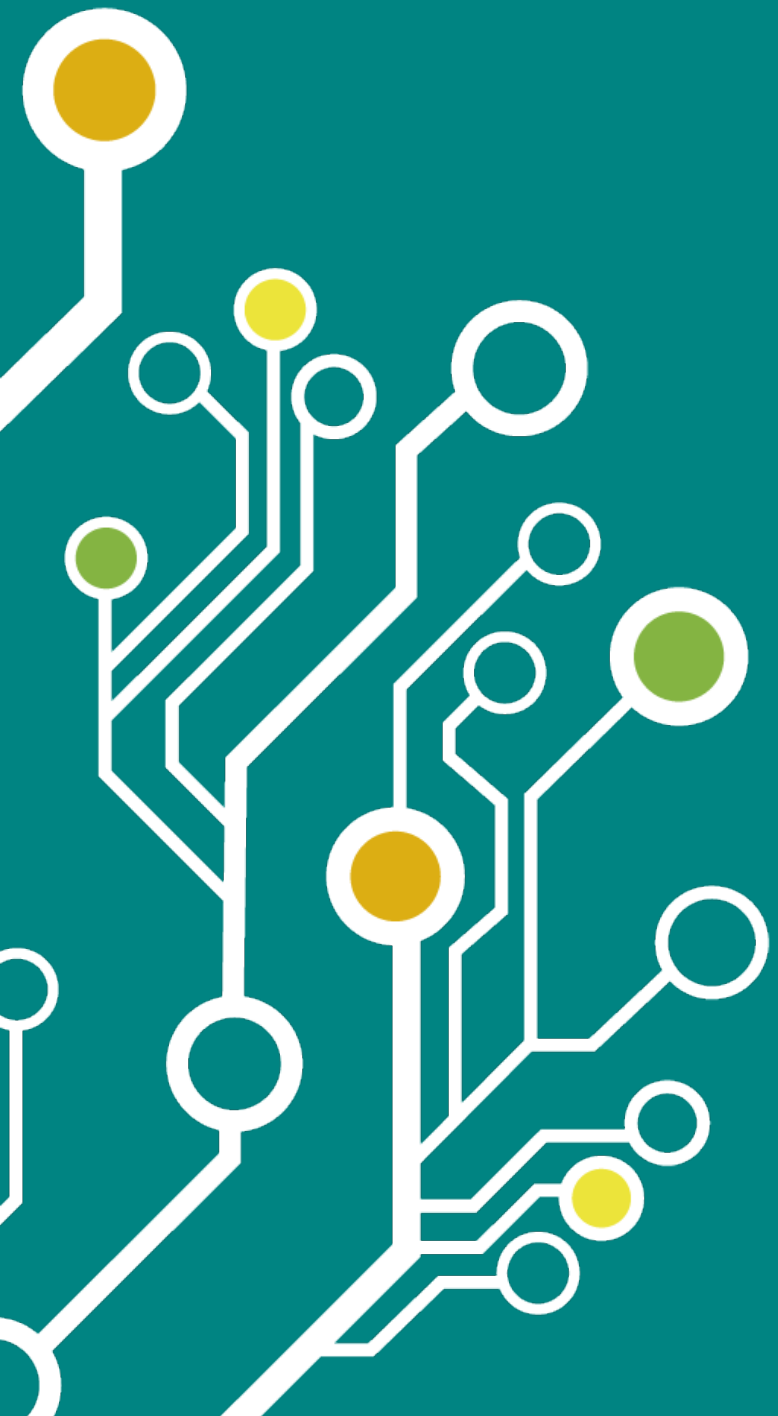
Nós e Tópicos



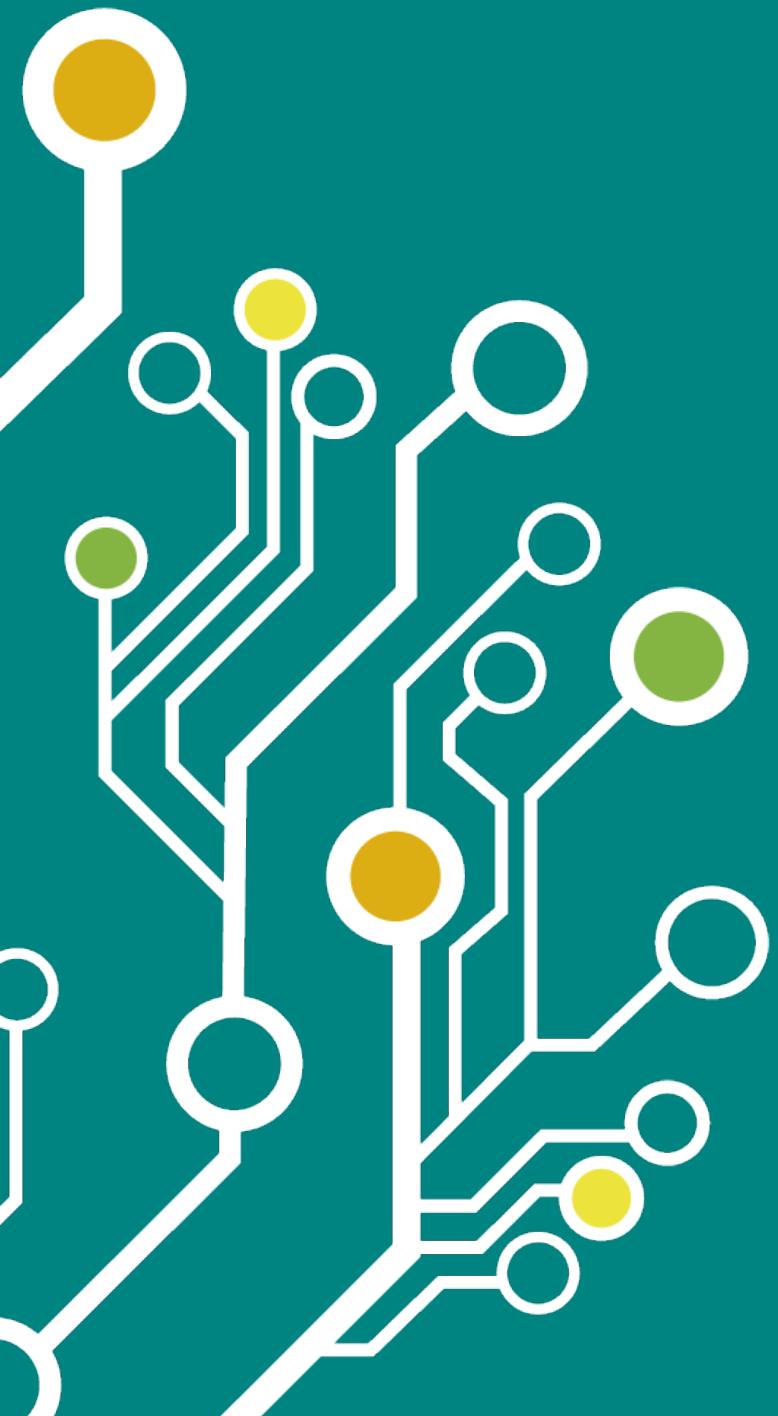
A representação do funcionamento da relação entre os Nós e Tópicos do software pode ser representada por meio de um grafo.



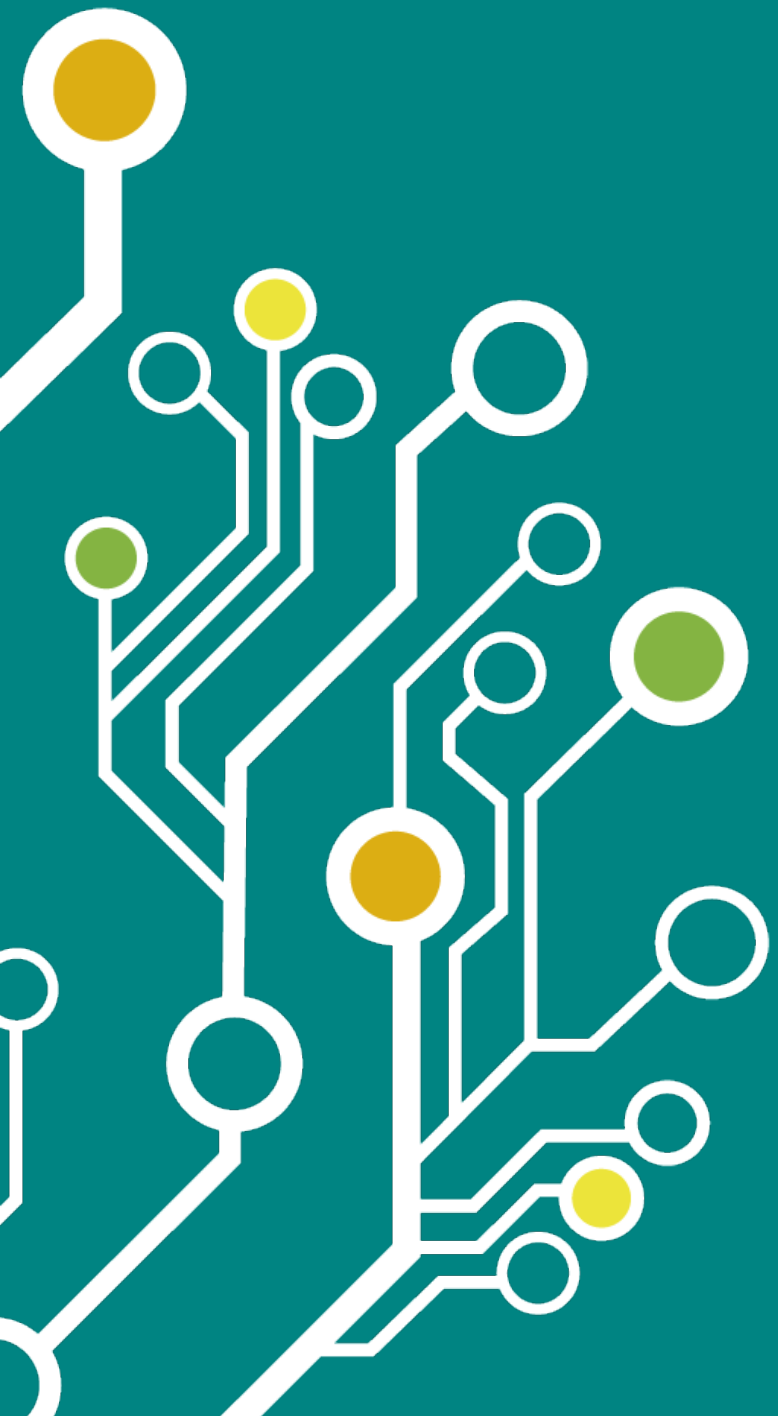
Cada nó é um programa que pode receber ou enviar dados para outros programas, sendo os dados enviados chamados de tópicos.



Um mesmo Nó pode receber e enviar vários tópicos, e um mesmo Tópico pode receber e enviar mensagens para vários Nós, sem restrição.



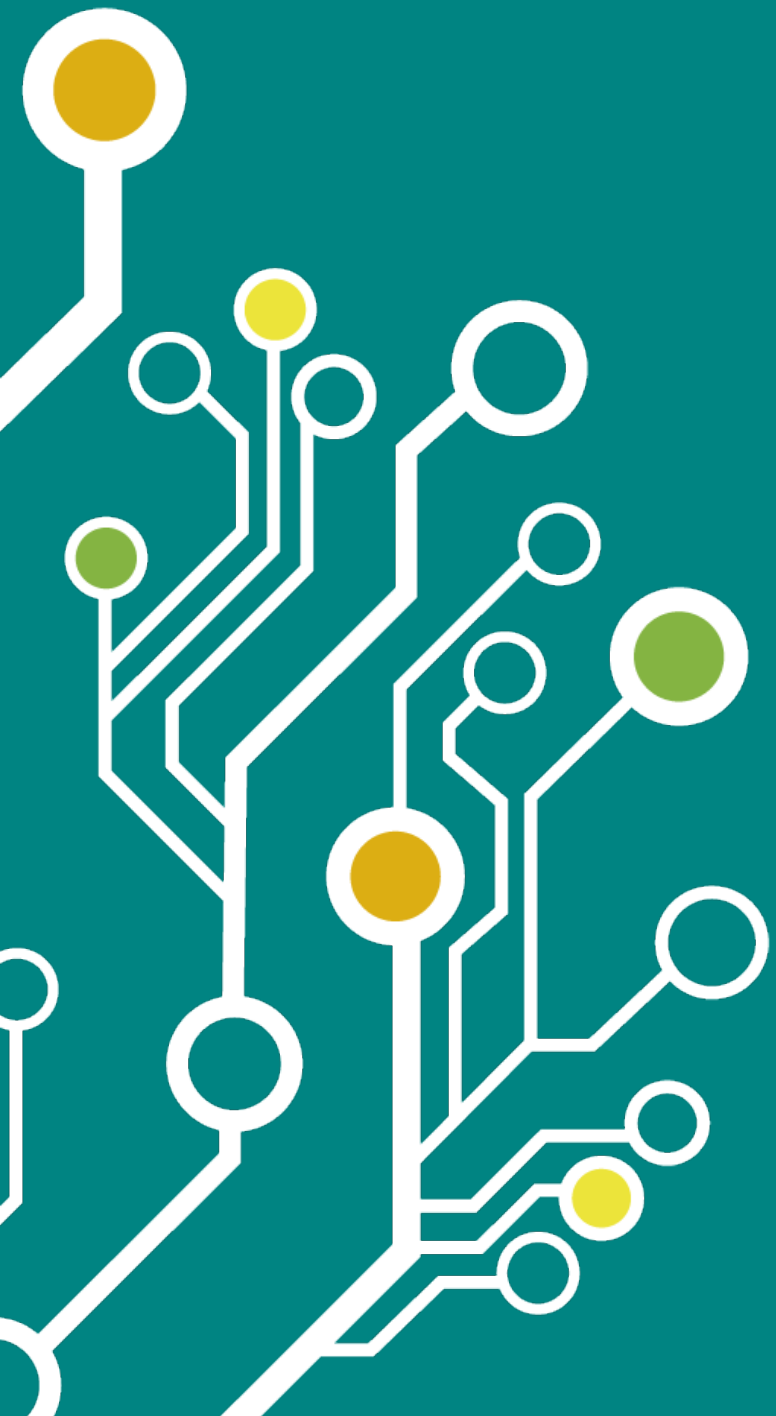
Existem dois tipos de Tópicos. Os Publisher (publicar) e os Subscriber (subscrever).



INSTITUTO TECNOLÓGICO VALE

VALE

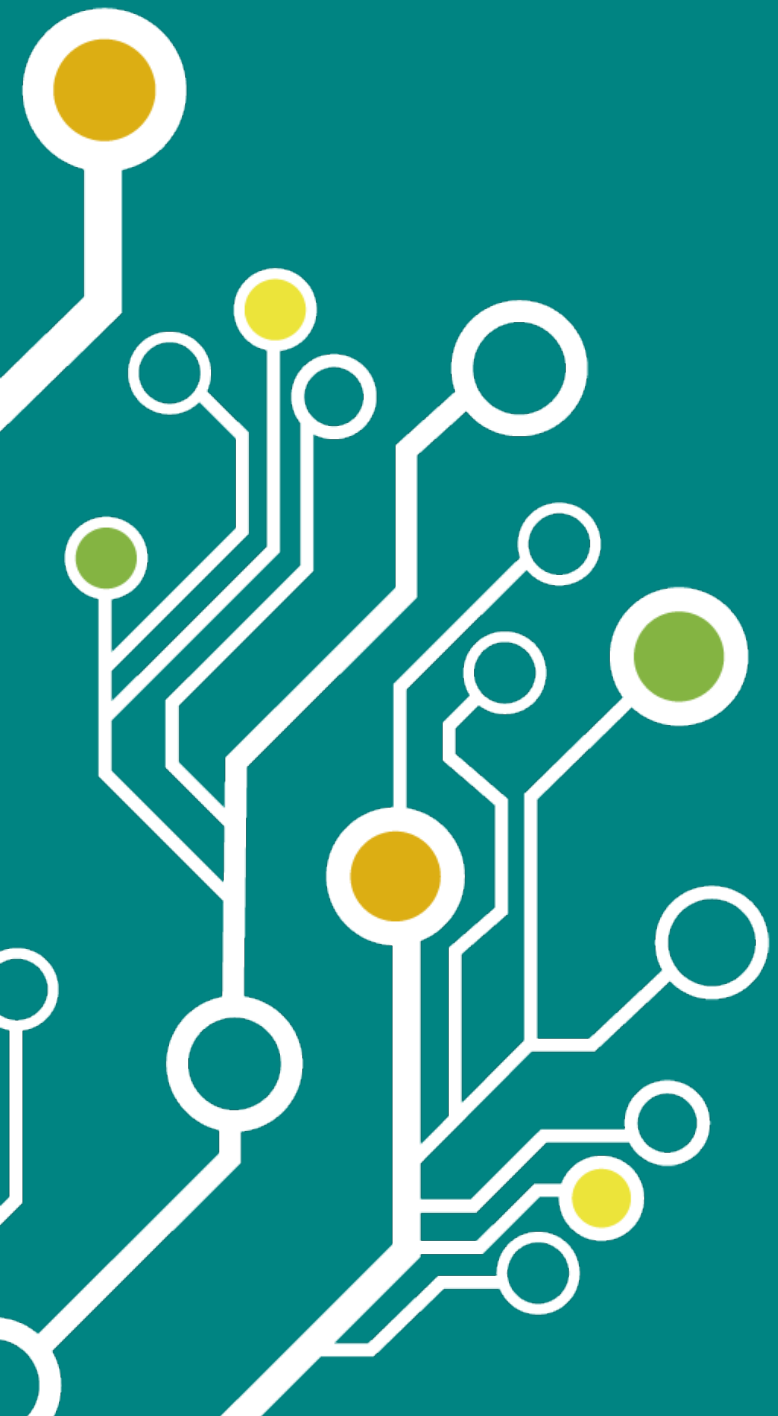
Exemplo prático



INSTITUTO TECNOLÓGICO VALE

VALE

V-rep



V-rep

Seu funcionamento é baseado em uma arquitetura de controle distribuída, onde cada objeto/modelo pode ser controlado separadamente via um script, plugin, algum API remoto entre outros.

Isto torna o V-rep ideal para aplicações com vários robôs e diferentes linguagens de controle: C/C++, Python, Java, Lua, Matlab e Octave.

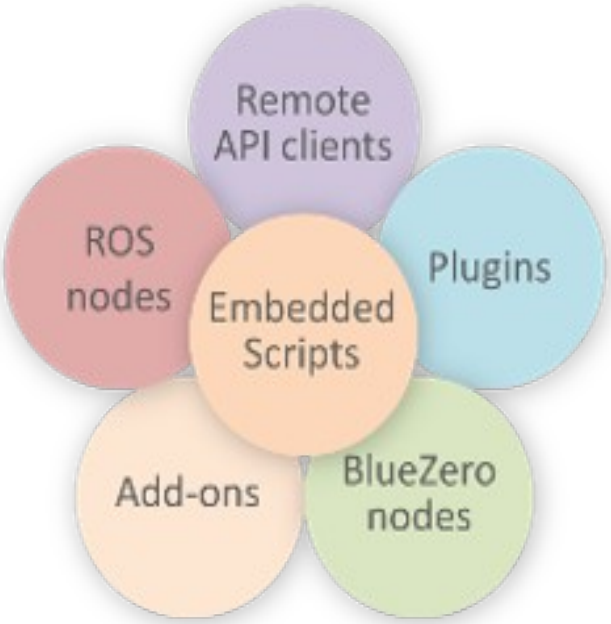
V-rep

O V-rep pode ser utilizado em diversas plataformas e tem a vantagem de

Isso é permitido por meio de uma API (Application Programming Interface) elaborada.

Seis abordagens diferentes de programação ou codificação são suportadas, onde todas as seis são mutuamente compatíveis.

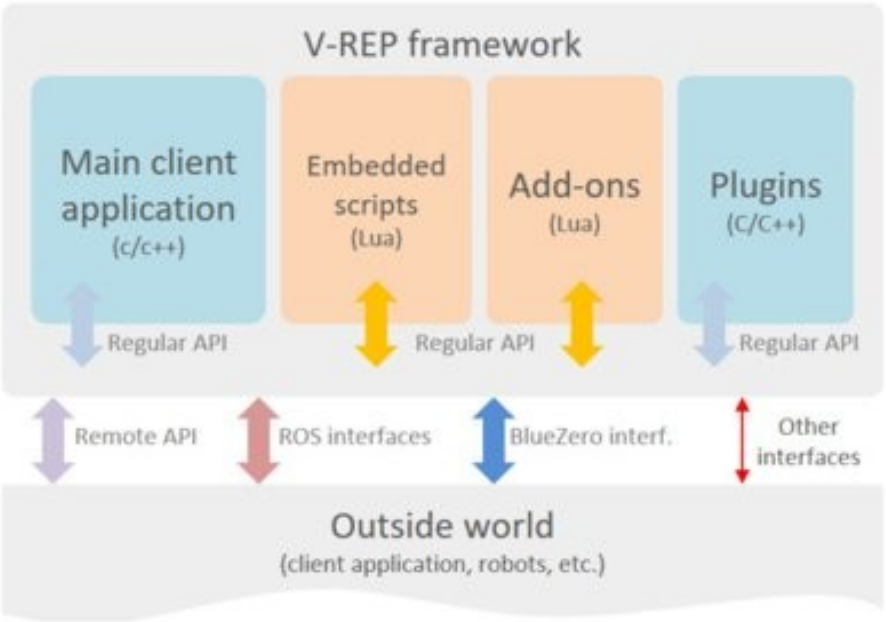
V-rep

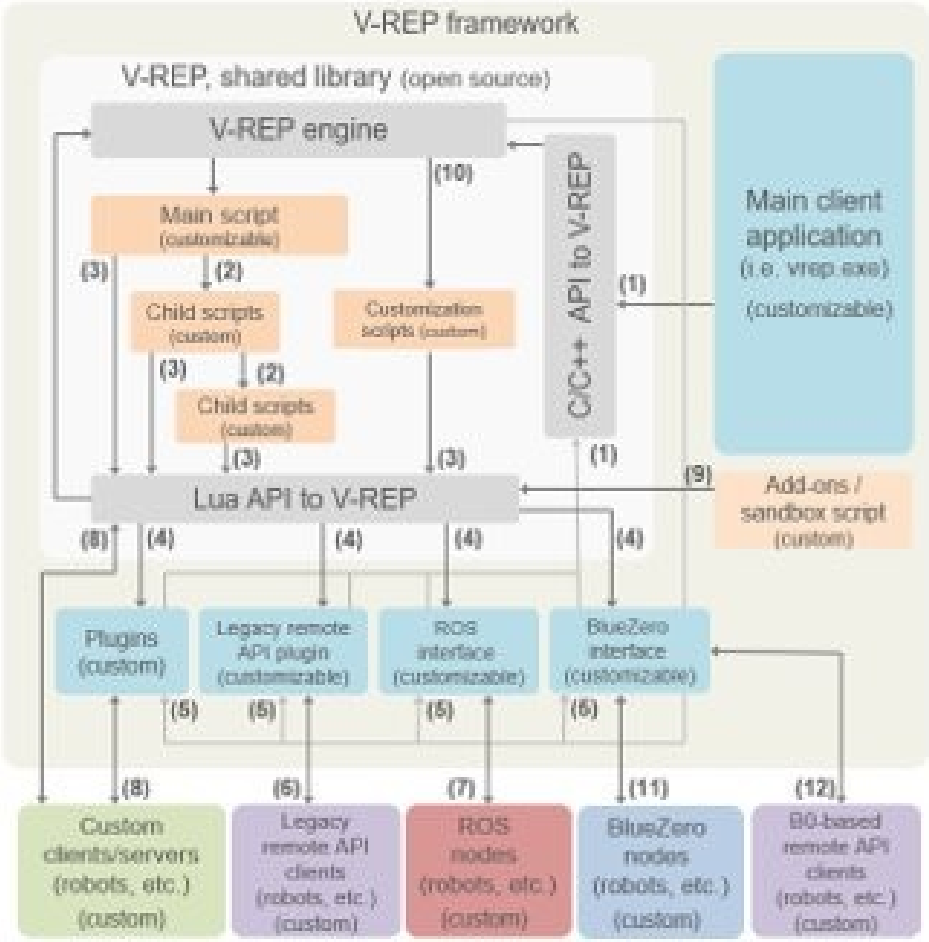


A entidade de controle de um modelo, cena ou o próprio simulador pode estar localizada em:

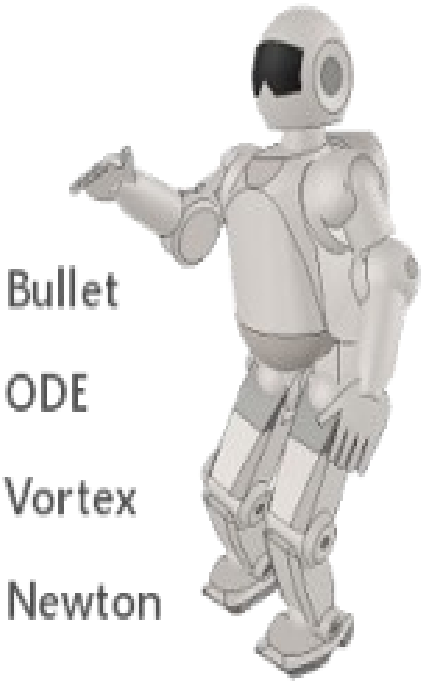
- Script
- add-on or the sandbox script
- Plugin
- API remoto
- ROS
- BlueZero

V-rep


V-REP framework
Main client application (c/c++)
Embedded scripts (Lua)
Add-ons (Lua)
Plugins (C/C++)
Regular API
Regular API
Regular API
Remote API
ROS interfaces
BlueZero interf.
Other interfaces
Outside world
(client application, robots, etc.)


V-REP framework
V-REP, shared library (open source)
V-REP engine
Main script (customizable)
Child scripts (custom)
Child scripts (custom)
Customization scripts (custom)
C/C++ API to V-REP
Lua API to V-REP
Main client application (i.e. vrep.exe) (customizable)
Add-ons / sandbox script (custom)
Plugins (custom)
Legacy remote API plugin (customizable)
ROS interface (customizable)
BlueZero interface (customizable)
Custom clients/servers (robots, etc.) (custom)
Legacy remote API clients (robots, etc.) (custom)
ROS nodes (robots, etc.) (custom)
BlueZero nodes (robots, etc.) (custom)
BZ-based remote API clients (robots, etc.) (custom)

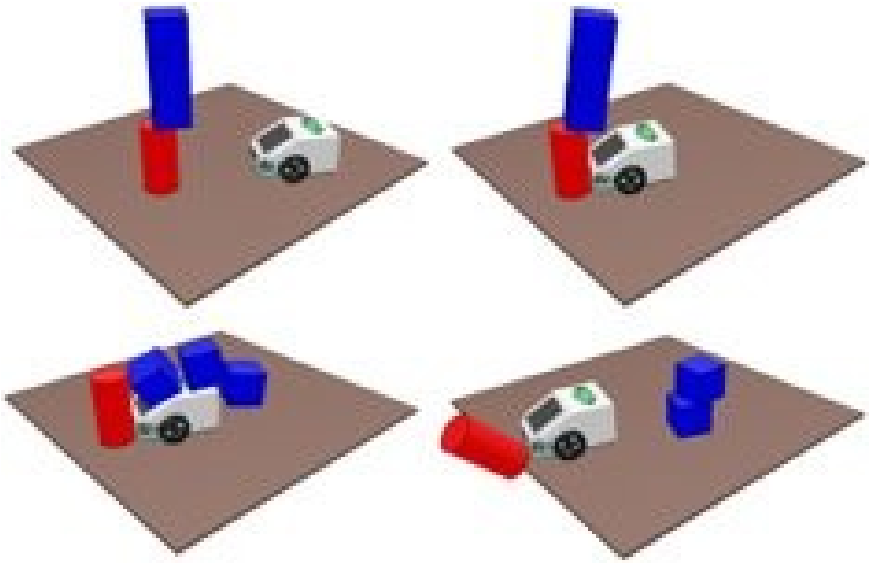
V-rep



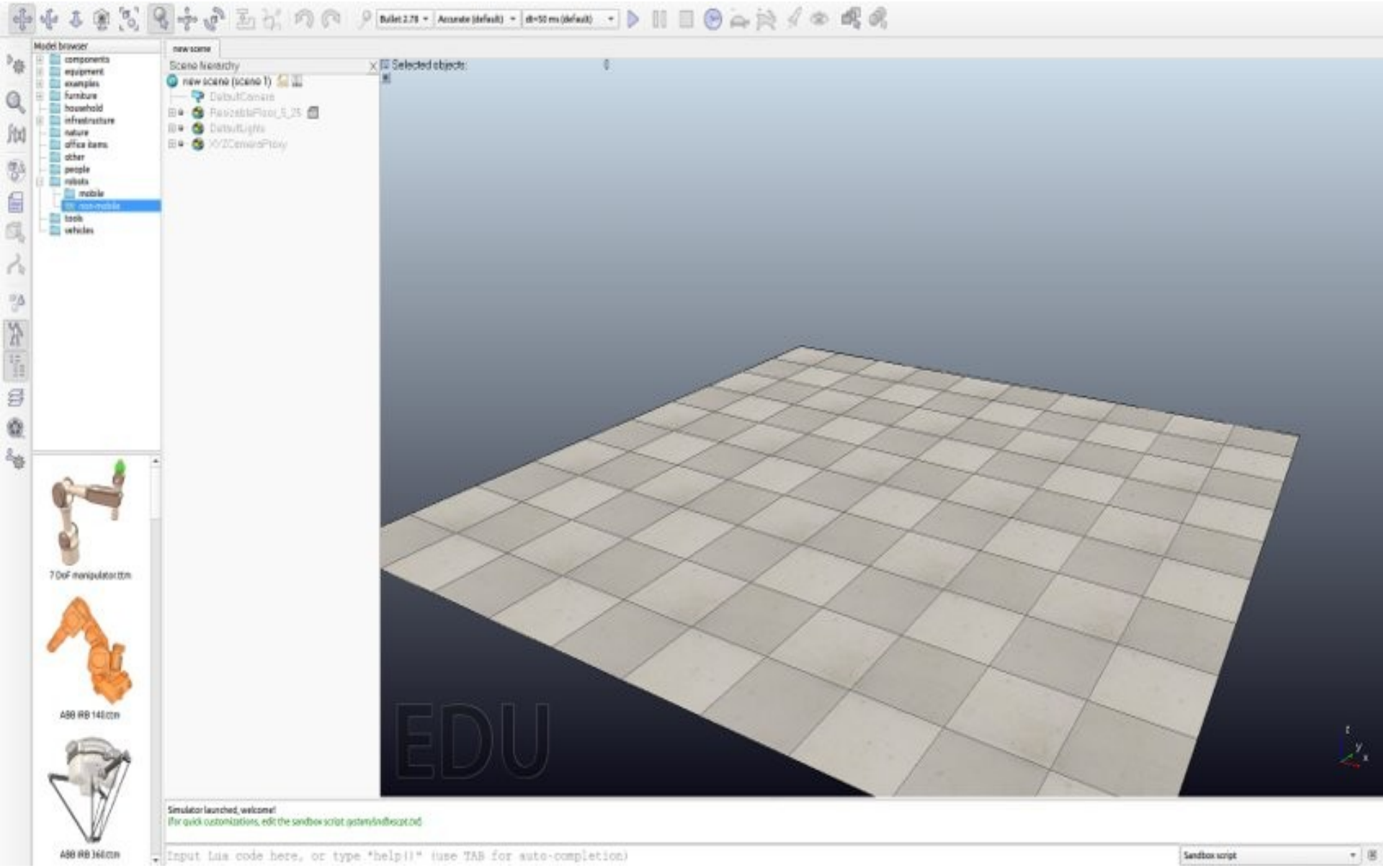
o módulo de dinâmica do V-REP suporta quatro mecanismos de física diferentes:

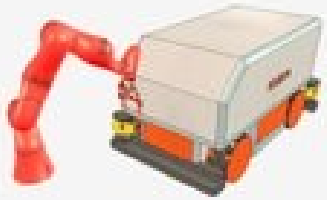
- Biblioteca de física Bullet
- Open Dynamics Engine
- Vortex Studio engine
- Newton Dynamics engine

V-rep



V-REP não é um simulador de dinâmica pura. Pode ser visto como um simulador híbrido que combina cinemática e dinâmica para obter o melhor desempenho para vários cenários de simulação.


Model browser
components
equipment
examples
furniture
household
infrastructure
nature
office items
other
people
robots
mobile
non-mobile
tools
vehicles
new scene
Scene hierarchy
new scene (scene 1)
DefaultCamera
ResizableFloor_5_25
DefaultLights
XYZCameraProxy
Selected objects
7 DoF manipulator.ttm
ABB IRB 140.ttm
ABB IRB 360.ttm
EDU
Simulator launched, welcome!
Input Lua code here, or type "help()" (use TAB for auto-completion)
Sandbox script

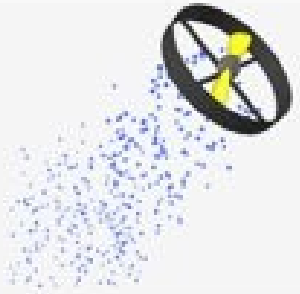


Collision Detection

Fast interference checking between any meshe, octree, point cloud, or collection of those.

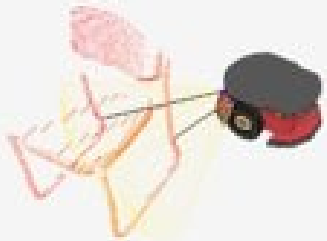
Minimum Distance Calculation

Fast and exact minimum distance calculation between any meshe (convex, concave, open, closed), octree, point cloud, or collection of those.



Dynamic Particles

V-REP supports customizable particles that can be used to simulate air or water jets, jet engines, propellers, etc.



Proximity Sensor Simulation

Powerful, realistic and exact volumetric proximity sensor simulation: performs an exact minimum distance calculation within a customizable detection volume. Operates on meshes, octrees and

Vision Sensor Simulation

Simulation of vision sensors with many image processing options, fully customizable and extendable (e.g. via plugin).

Building Block Concept

Anything - from sensors or actuators, to whole robotic systems - can be built within V-REP by combining basic objects and linking various functionality via embedded scripts. Every scene object can have

v-rep

ARGoS

Large-scale robot simulations

GAZEBO