University of Ljubljana
Faculty of Electrical Engineering

COLLABORATIVE ROBOTICS CENTRE

KDR-ROS
ROS

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www.robolab.si
www.cobotic.si

Linux distribucija

Ubuntu 18.04 LTS Bionic Beaver

https://releases.ubuntu.com/18.04.5/?_ga=2.67979218.238040191.1613296022-269339031.1613296022

ROS Melodic Morenia

http://wiki.ros.org/melodic/Installation/Ubuntu

Robotics Operating System

Kaj je skupnega?


Martin Cooper, Motorola (1983)

Steve Wozniak in Steve Jobs

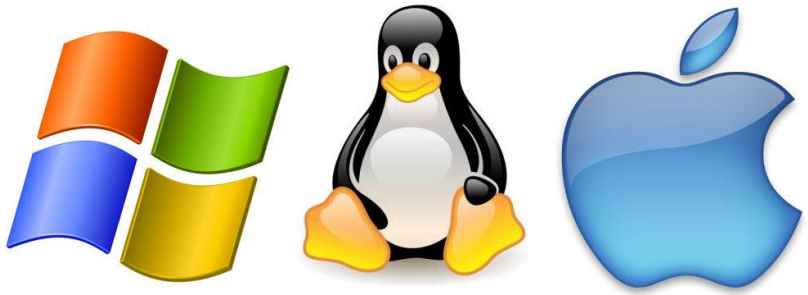
Popularizirani produkti

STROJNA OPREMA

Popularizirani produkti

STROJNA OPREMA

OPERACIJSKI SISTEM



Popularizirani produkti

STROJNA OPREMA

OPERACIJSKI SISTEM

APLIKACIJE

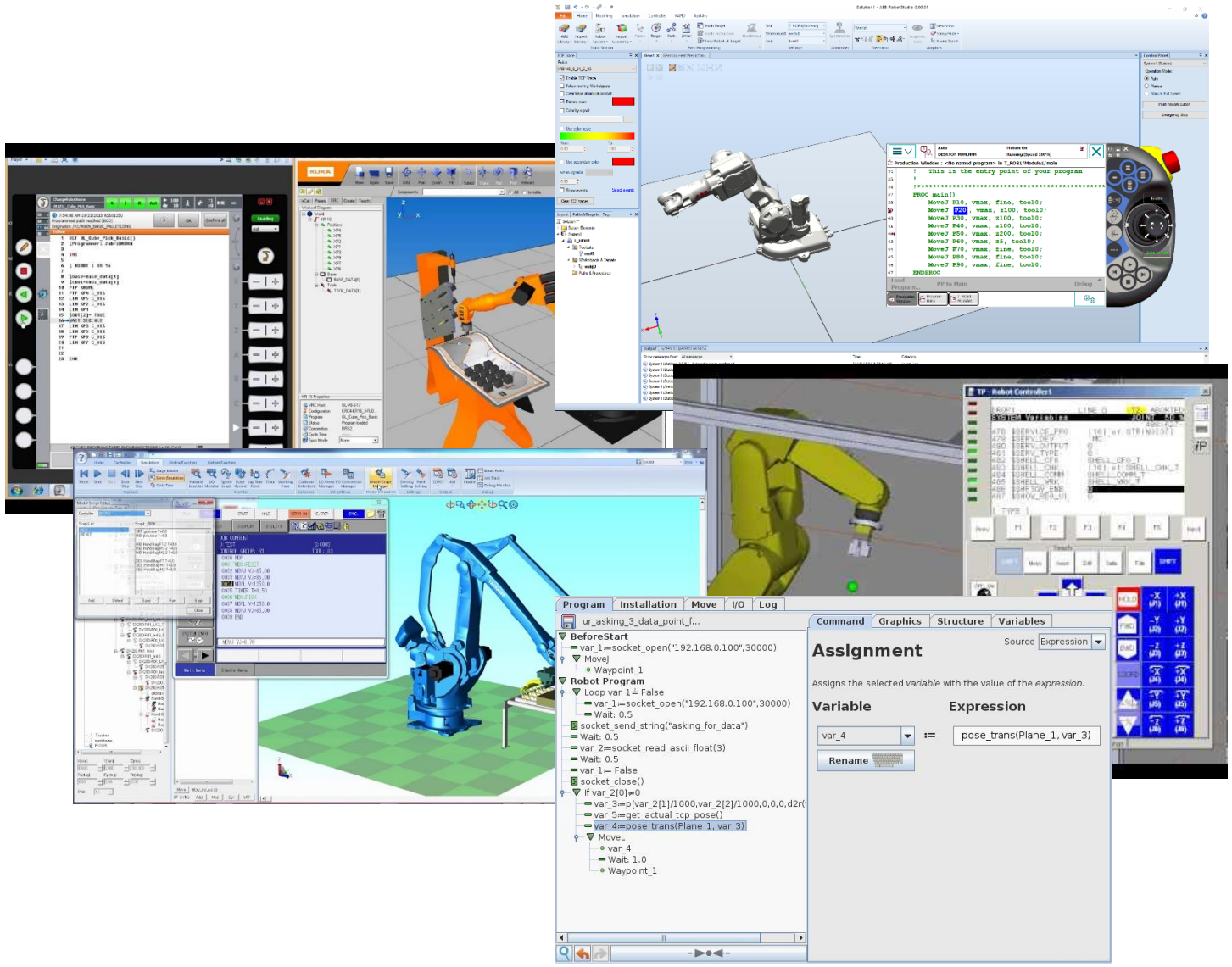

"la Caixa"
Línea ADSL
PULSAR
SONY
barça tv
movistar
TOYOTA COTXE OFICIAL DEL FC BARCELONA
Estrella Damm
Telefónica

Ustrezna programska oprema

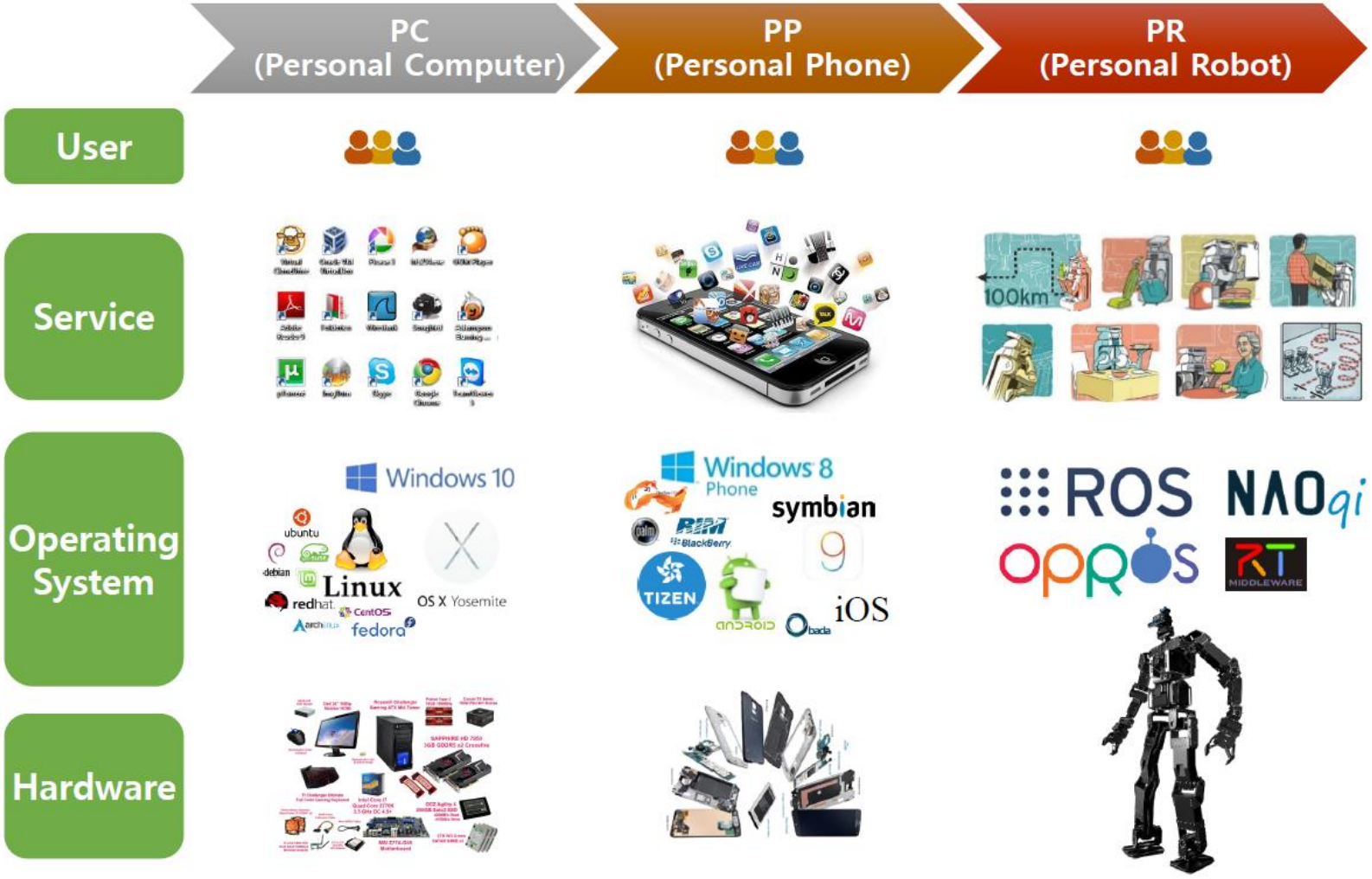
- Integracija s strojno opremo
- Standardizacija in modularnost strojne opreme
- Padec cene, dvig zmogljivosti
- Ločitev strojne opreme, operacijskega sistema in aplikacij
- Individualizacija potreb uporabnika
- Več uporabnikov (svoj ekosistem)

Kaj pa robotika?

- RAPID (ABB)
- INFORM (Yaskawa)
- KRL (Kuka)
- KAREL (Fanuc)
- PDL2 (Comau)
- AS (Kawasaki)
- VAL3 (Staubli)
- URScript (Universal Robots)
- …



Ponavljanje zgodovine?




ROS

Kaj je ROS?

The Robot Operating System (ROS) is a set of software libraries and tools that help you build robot applications. From drivers to state-of-the-art algorithms, and with powerful developer tools, ROS has what you need for your next robotics project. And it's all open source.

ROS = Meta-operating system; a system that performs scheduling, loading, monitoring, error handling and utilizing distributed computing resources as a virtualization layer between applications and distributed computing resources

ROS zasnova


Client Layer
roscpp
rospy
roslisp
rosjava
roslibjs
Robotics Application
MoveIt!
navigatioin
executive smach
descartes
rospeex
teleop pkgs
rocon
mapviz
people
ar track
Robotics Application Framework
dynamic reconfigure
robot localization
robot pose ekf
Industrial core
robot web tools
ros realtime
mavros
tf
robot state publisher
robot model
ros control
calibration
octomap mapping
vision opencv
image pipeline
laser pipeline
perception pcl
laser filters
ecto
Communication Layer
common msgs
rosbag
actionlib
pluginlib
rostopic
rosservice
rosnode
roslaunch
rosparam
rosmaster
rosout
ros console
Hardware Interface Layer
camera drivers
GPS/IMU drivers
joystick drivers
range finder drivers
3d sensor drivers
diagnostics
audio common
force/torque sensor drivers
power supply drivers
rosserial
ethercat drivers
ros canopen
Software Development Tools
RViz
rqt
wstool
rospack
catkin
rosdep
Simulation
gazebo ros pkgs
stage ros

F1: Komunikacijska podpora

- Zagotavlja komunikacijo med posameznimi deli
- Komunikacijski vmesnik med strojno opremo in aplikacijo (middleware)

- Sinteza in analiza sporočil
- Snemanje in predvajanje sporočil
- Uporaba različnih programskih jezikov za posamezne dele
  - roscpp, rospy, roslisp, rosjava, roslua, roscs, roseus, PhaROS, rosR

F2: Robotsko podprte funkcionalnosti

- Definicija standardnega sporočila za robote
- Izračun robotskih parametrov (transformacije)
- Jezik za opis robota
- Diagnostika
- Senzorika in zaznavanje
- Navigacija
- Manipulacija (DK, IK)

F3: Razvojna orodja

- Zagotavlja orodja za hiter in učinkovit razvoj aplikacij

- Konzolni ukazi
- RVIZ
  - 3D vizualizacija
- RQT
  - UI, shranjevanje/predvajanje sporočil, vizualizacija povezav
- Gazebo
  - 3D simulacija z vključeno fiziko