Napredni operativni sistemi

Savremeni operativni sistemi - stanje i perspektive -

Prof. dr Dragan Stojanović

Katedra za računarstvo
Elektronski fakultet u Nišu

Literatura

- **Outlook on Operating Systems**,
  - Dejan Milojičić, Hewlett Packard Labs, Timothy Roscoe, ETH Zurich
  - IEEE Computer, Vol 49, No. 1, Jan. 2016, pp: 43-51

- **Toward Ubiquitous Operating Systems: A Software-Defined Perspective**
  - Hong Mei, Yao Guo, Peking University
  - IEEE Computer, Jan 2018

Uticaji na razvoj OS

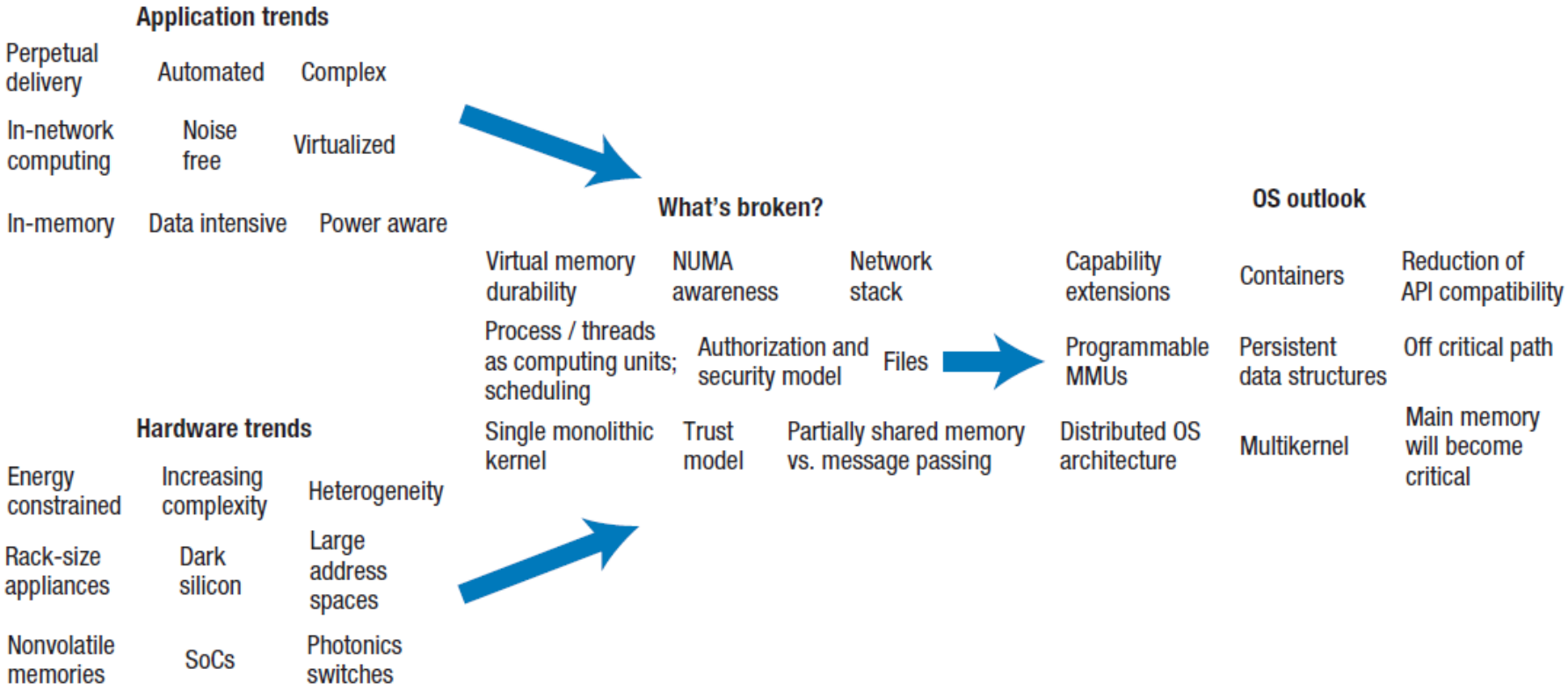
- Hardverski trendovi
  - Kompleksnost
  - Energija
  - Trajna (*nonvolatile*) glavna memorija
  - Sistemi na čipu (SoC)
  - Raznolikost hardvera i mikroprocesorskih arhitektura
  - …
- Promene u aplikativnom softveru
  - Izazovi aplikacija u data centrima i *rack-scale computing*
  - Veliki podaci (*Big data*, *Data-intensive computing*)
  - Virtuelizacija i kontejneri
  - Kompleksnost distribuiranih aplikacija
  - …

Savremeni OS – Gde su problemi?

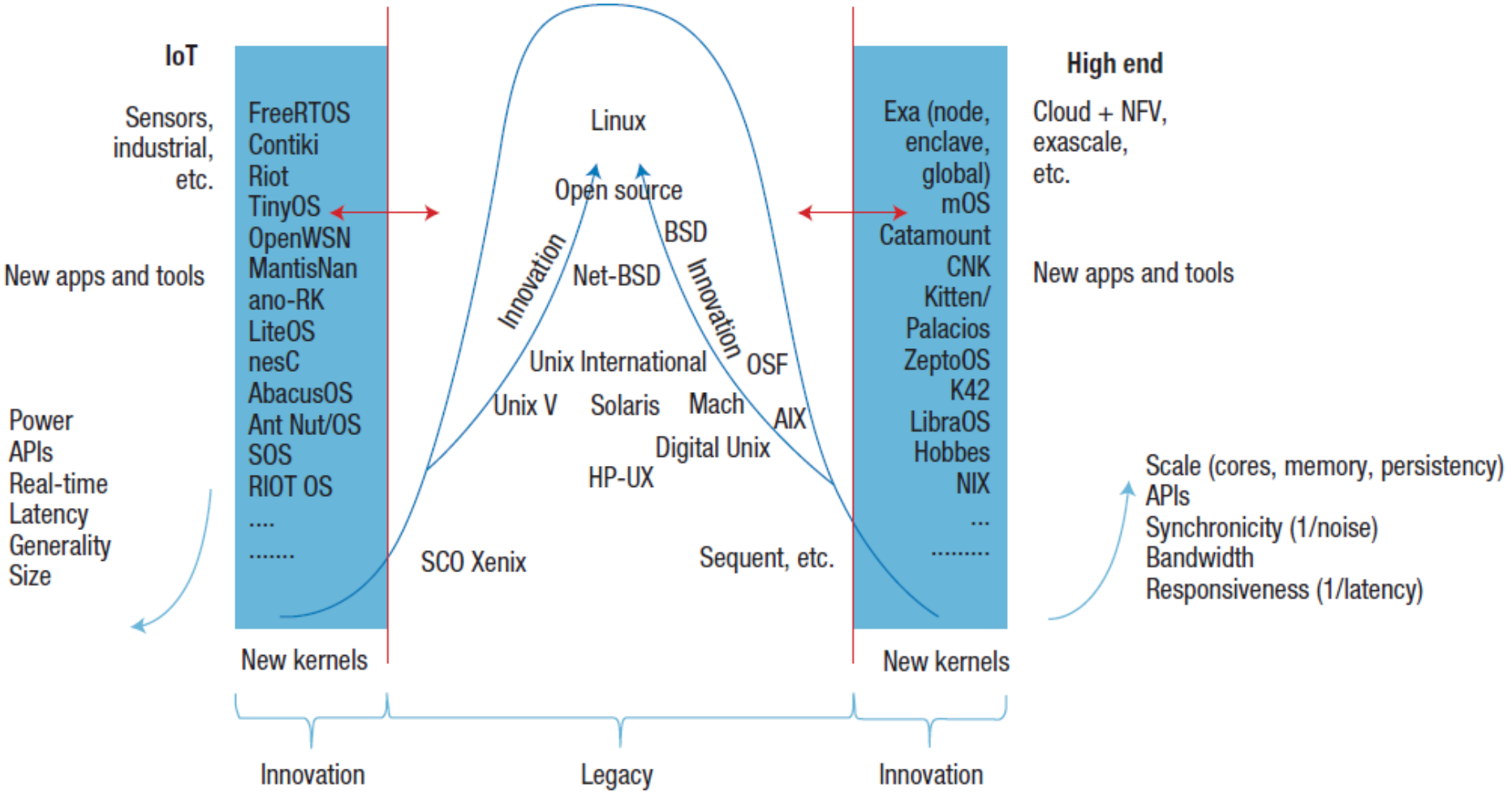
- Jedinstveni, monolitni kernel
- Autorizacija, autentikacija i sigurnost
- Planiranje i raspoređivanje
- Virtuelna memorija
- Mrežni protokoli (*stack* protokola)
- Skladištenje podataka (datoteke i direktorijumi)
- …

Pogled na Operativne sisteme

- Uticaj hardverskih i aplikacionih trendova na OS-e
- Problemi u tekućem dizajnu OS, i pogled na OS budućnosti



Perspektive OS



TOWARD UBIQUITOUS OPERATING SYSTEMS: A SOFTWARE-DEFINED PERSPECTIVE

TABLE 1. Evolution of traditional operating systems.

Timeframe	Representative OS(s)	Computer system	Main characteristics
1956	GM-NAA I/O	IBM 704	The first practical OS Simple batch processing I/O management
1960s	IBM OS/360 series	IBM 360 series—mainframes	Time-sharing Multibatch processing Memory management Virtual machines (VM/370)
1970s	Unix	Minicomputers/workstations	First modern OS Developed with machine-independent languages (C) Provides standard interfaces Integrated development environment
1980s	Mac OS, Windows, Linux	Personal computers (PCs)	Provides modern GUI Improves usability for personal users
2000s	Apple iOS, Google Android, Windows Phone	Smartphones	Customization of traditional OSs Improves usability for mobile devices New app delivery model (App Store, Google Play)

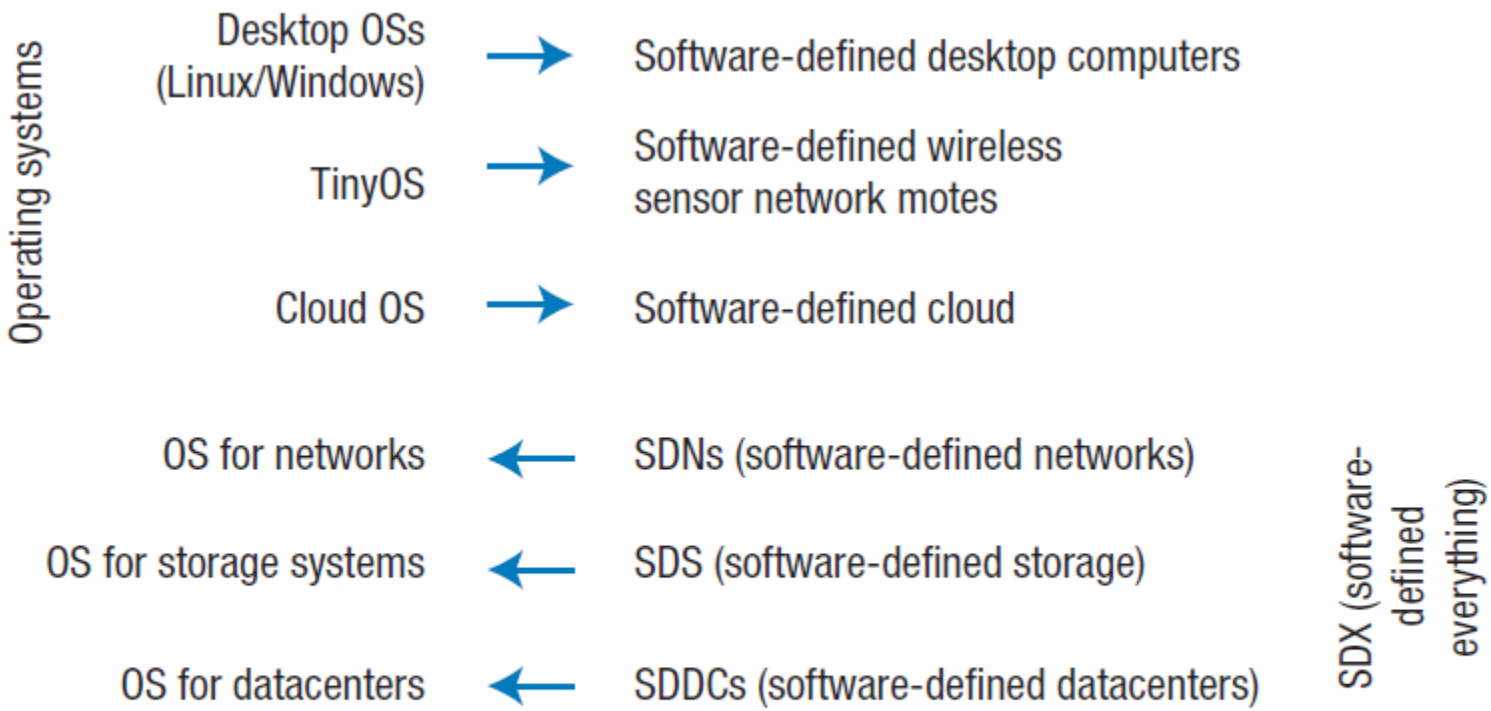


FIGURE 1. Operating systems and software-defined systems are mostly based on the same principles.

UBIQUITOUS OPERATING SYSTEMS

- *Web OS*
- *The Robot Operating System – ROS*
- *HomeOS*
- *City OS*
  - Living PlanIT Urban Operating System - living-planit.com
- *Cloud OS*
  - OpenStack and Apache CloudStack
- *IoT OS*

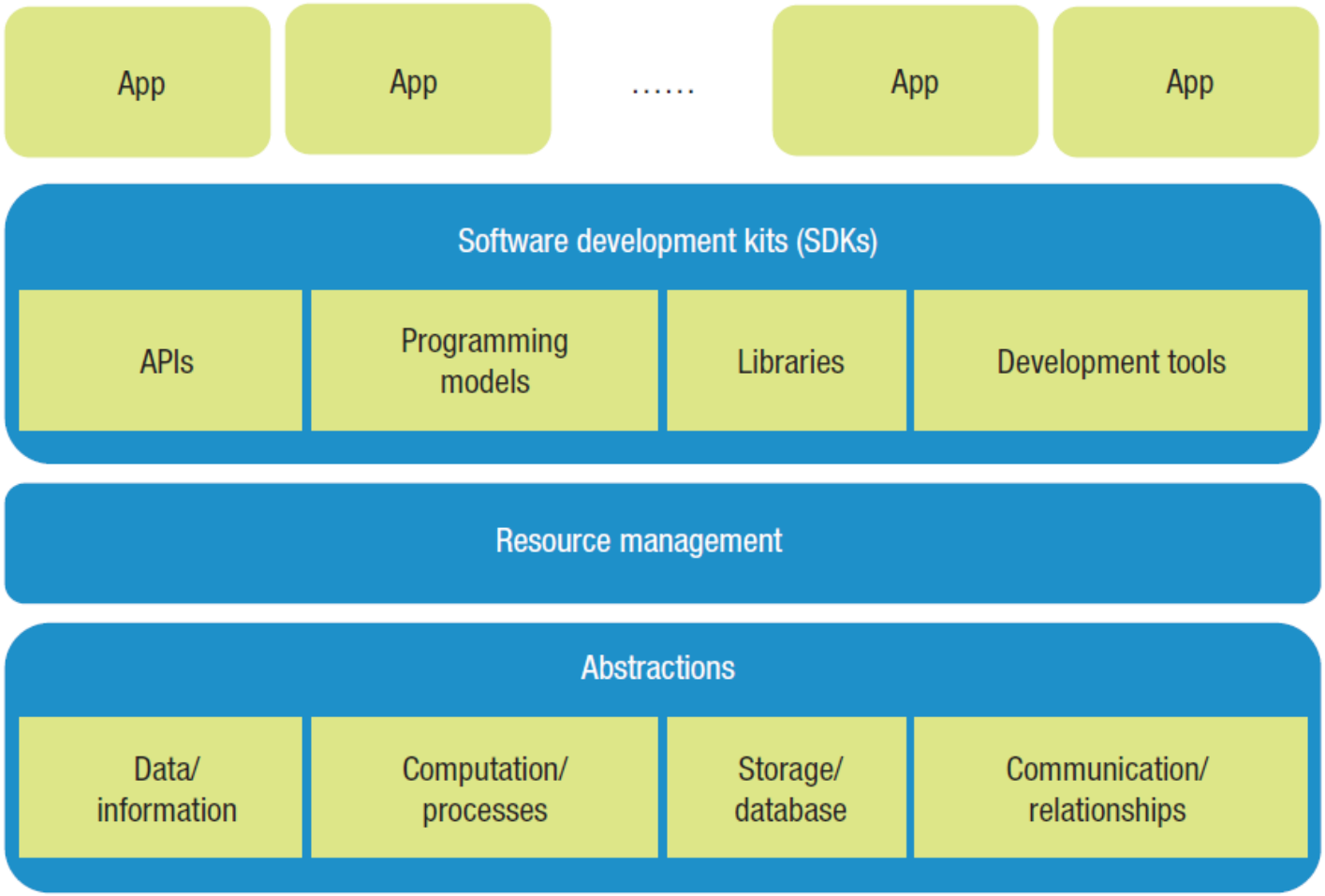


FIGURE 2. General ubiquitous operating system (UOS) architecture. A UOS provides abstractions to manage hardware and software as well as resource virtualization along with programming and runtime support for applications, especially those created by third-party developers.

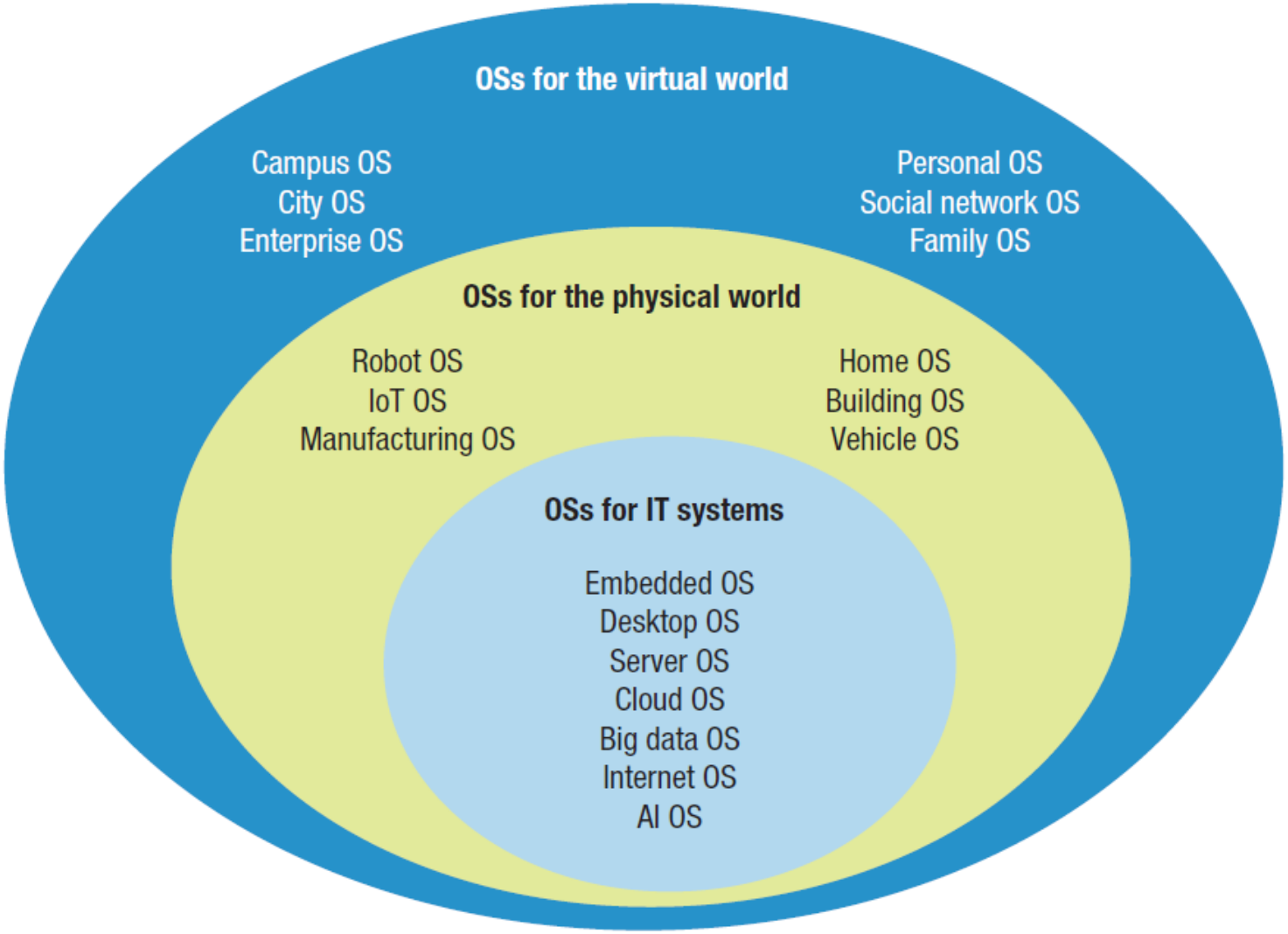


FIGURE 3. Different categories of UOSs for real and virtual entities as well as traditional IT systems.

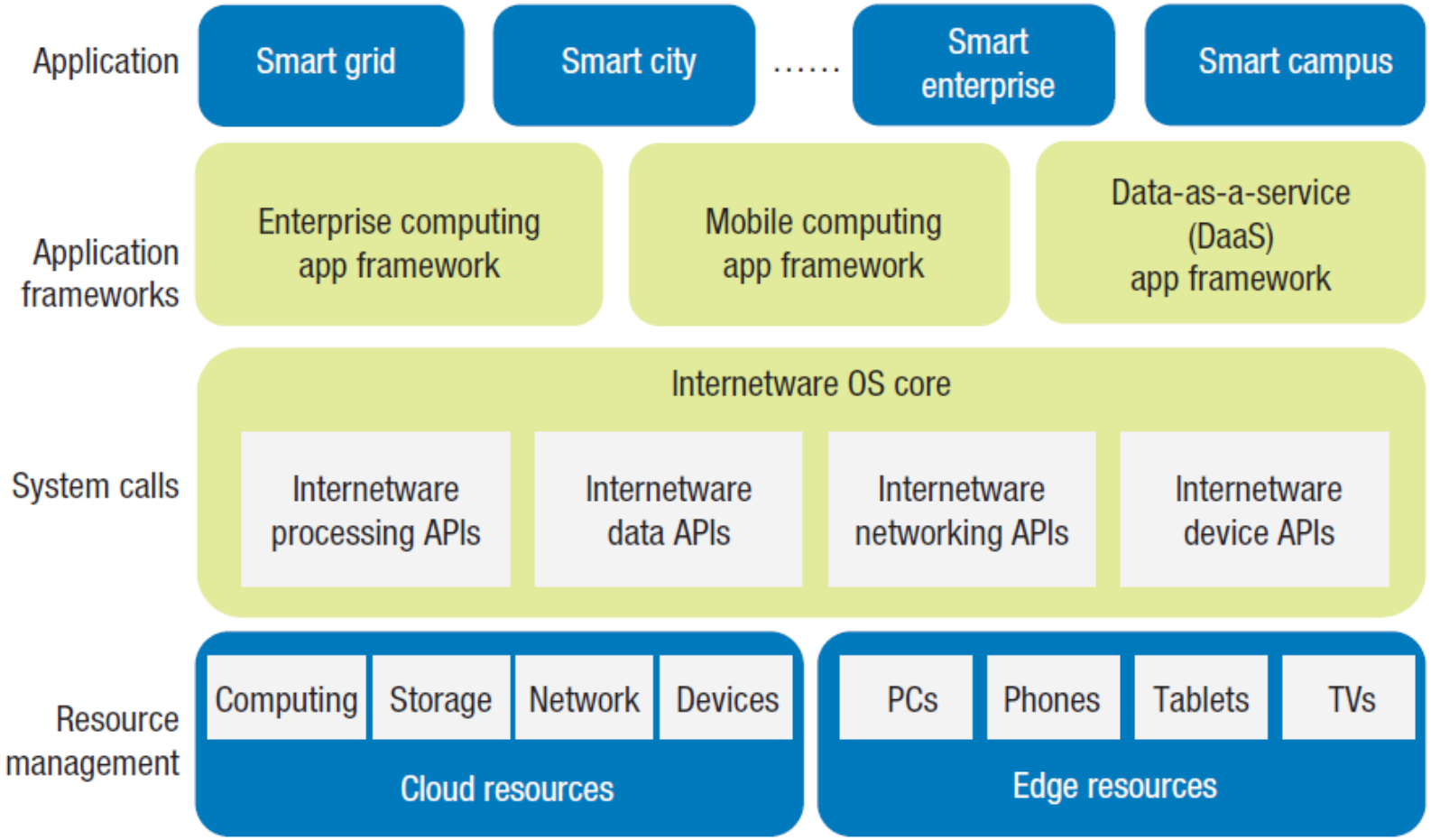


FIGURE 4. Internetware OS architecture. Internetware applications run on top of the cloud and edge devices. The Internetware OS core provides abstractions to manage both cloud and edge resources, while an application framework layer accommodates applications for different domains.

Pitanja i komentari