



Políticas y estrategias para cómputo de alto rendimiento y telecomunicaciones en la UNAM

Dirección General de Cómputo y de Tecnologías de
información y Comunicación

Dirección de Sistemas y Servicios Institucionales

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Agenda:

- Responsabilidades del CATIC UNAM
- Números de las TIC en la UNAM
- Tendencias y políticas en las TIC universitarias
- Conclusiones



Responsabilidades del CATIC UNAM

- Establecer las políticas y recomendaciones que sirvan de base para el diseño de los planes estratégicos de la UNAM en materia de tecnologías de información y comunicación
- Sugerir las políticas para guiar, apoyar y contribuir en la toma de decisiones para el desarrollo, adquisición, administración y uso de las tecnologías de información y comunicación
- Crear los comités especiales o permanentes para investigar, estudiar y generar encuestas que permitan a los miembros del CATIC fundamentar sus opiniones y propuestas.
- Promover iniciativas para mantener al día la información relacionada con los recursos de cómputo en la Universidad, incluyendo hardware, software, laboratorios de cómputo, acuerdos con proveedores y otras organizaciones, infraestructura de telecomunicaciones, entre otros y
- Promover la búsqueda de fuentes de financiamiento internas y externas para apoyar el desarrollo de las TIC en la UNAM.



Números de las TIC en la UNAM

- **Networking**

- **Data:** RedUNAM is one of the largest data networks installed in an academic institution, with more than 75K physical data ports (UTP), plus a thousand WiFi Access Points. More than 200K WiFi accounts delivered to the community.
- **Broadband access:** 6.5 Gpbs of connectivity to public Internet, plus 10 Gbps to the NREN (CUDI) which derives in the access to international research and education networks
- **Metropolitan Delta:** Dark fiber infrastructure into Mexico City's subway, interconnecting the three major campus with supercomputing capacity in equal number of institutions (72 optic wires, only 2 currently being used)
- **Voice:** More than 18K digital extensions, plus 750 mobile lines and a hundred VoIP devices.
- **Video:** Plus than 260 videoconference rooms spread all over the national and foreign campuses.



Números de las TIC en la UNAM

- **Cómputo**

- Más de 76K dispositivos digitales propiedad de la Universidad, oscilando desde tabletas hasta servidores, todos conectados a RedUNAM y la Internet.
- **Otros clusters:** Clúster ALICE cluster con 1024 cores medio petabyte de almacenamiento, operando como Tier-2 para el LHC @ CERN, más un cluster de procesadores Power 7 y Power 5 con capacidad de 600 cores.
- **Centro de datos:** 100 nodos de cómputo, similar a los de la supercomputadora, dedicados a la nube privada de la UNAM. Virtualizando al día más de 200 servidores con una tasa de compresión de 15 a 1, almacenamiento de 500 terabytes en SAN y NAS.
- **Software:** Licenciamiento institucional en diversos productos, con una tienda en línea para la descarga de licencias, manuales y entrenamiento en línea..
- **Visualization:** Le observatorio más grande de América Latina para inmersión en 3D dentro de mundos virtuales



El supercómputo en la UNAM

- Primera supercomputadora en América Latina: Cray Y-MP (circa 1991)
- Quinta generación de supercómputo (Miztli – 118 TeraFLOPS. (circa 2013)
- Programa de becarios en Cómputo de Alto Rendimiento, Realidad Virtual y Visualización Científica.
- +130 proyectos de investigación en curso
- Comité Académico de Supercómputo: órgano multidisciplinario para la asignación de recursos y definición de estrategias.
- Decenas de publicaciones arbitradas por investigadores de la UNAM derivadas del supercómputo.
- Principales áreas de investigación: Química, Física de Altas Energías, Astronomía, Genómica, Matemáticas, Materiales, Ingenierías, Geofísica, Biotecnología.



Tendencias y políticas en las TIC universitarias

- **Cloud computing.**
 - **Public cloud:** Due the cost limitations on the broadband access in Mexico, and before any improvements that new federal regulations could bring into this topic, it is highly recommended to use public cloud services only on non-critical applications and services, such as information backup, social networking and personal non-private data.
 - **Private cloud.** UNAM is making efforts to guarantee better local conditions for computing; storage and general IT services, as well as relevant investments have been made in local networks and the institution's backbone, reaching today from 10 to 40 Gbps in certain locations and conditions. Private cloud is recommended for critical and non-critical services under the umbrella of RedUNAM and UNAM DataCenter, whom are managed by DGTIC.



Tendencias y políticas en las TIC universitarias

- **Mobile**

- **Mobile devices.** These devices are undoubtedly more omnipresent in the University's campuses, situation that is putting more pressure on local resources such as WiFi Access and availability of power outlets for recharging. On mobile devices, hardware and software are responsibility of their respective owners or licensees. The institution could acquire these devices for several purposes such as investigations, education processes and administration tasks with no guarantee of service or stability unless a Mobile Device Manager is implemented in the local area.
- **Mobile networks.** RIU (The institutional WiFi Network) must be kept offered for free to every member of the UNAM's community (students, faculty, researchers, employees). There is no pre-established blockage to Internet use over the RIU service, and the access to local content must be enforced with help of technologies such as cache and proxy servers, reducing the impact in the broadband access.



Tendencias y políticas en las TIC universitarias

- **Social networking**

- **Applications.** Users inside the institution are responsible for the content they publish on the social networks and never could associate their opinions and other materials as an institutional point of view, keeping safe the institution from any third party claim. The time spent in the social networking is sole responsibility of the users. No pre-established limitations are set on the use of these types of applications.
- **Information:** UNAM could use materials and or contents authored by the members of its community with the respective approval. Likewise, members of the community could use UNAM's proprietary content under the regulations and allowances provided in each one of the archives, web pages or other sources published by the institution. UNAM will enforce that the usage of ICT resources and tools must be primarily oriented to fulfil the institutional objectives: to educate, to research and to promote the culture.



Tendencias y políticas en las TIC universitarias

- **High performance computing**

- **Central supercomputing.** UNAM have set in operation the fifth generation of supercomputers since March 2013. Is recognised the relevance of supercomputing to reduce the expenses in general associated to scientific research, among many other advantages to improve the results of that research nation and worldwide. Provisioning of compute time in the supercomputer derives from the decisions at the core of the specialized multidisciplinary Supercomputing Academic Council, whom is responsible to call for projects, analyse their specific impact and goals and designate the resources from what is available. UNAM must increase the investments in this arena not only in terms of infrastructure, but specialized human resources training and graduate / postgraduate permanent development.
- **GRID computing.** Efforts must be increased for the collaboration in GRID projects. LANCAD (National Laboratory of High Performance Computing) participation trough the Metropolitan Delta Network – developed by UAM, CINVESTAV and UNAM- is mandatory. The sharing of software and hardware, as well as the continuous training for specialized GRID professionals must be reinforced by the collaboration in international projects such as ALICE (CERN – UNAM ICN DGTIC). A training facility and more research in GRID will be settled at the University to help the development of these professionals throughout the country and Latin American region.



Tendencias y políticas en las TIC universitarias

- **Data analytics**

- **Big data.** Computer science as well as scientific usage of ICT is the source basis for Big Data implementations in the institution. A central infrastructure to analyse structured and no structured data could help to improve continuous developments in all academic areas. New platforms for large amounts of data, besides the traditional databases, must be investigated, adopted and improved inside the University. Services as data crawling and local search engines, specialized in association of educational content as by-product of the academic archives and online production could be achieved, making a full integration of the regular institutional activities with the scientific advances.
- **Data science.** In the short term a strong necessity of professional and data scientist will appear not only for the university's purposes, but also as part of a new digital economy. UNAM must be ready to educate that type of human resources providing the test bed and operational infrastructure to accomplish their training.



Tendencias y políticas en las TIC universitarias

- **IT resources for education and cultural extension.**
 - **Hardware.** Usage of thin clients, where applicable, is recommended. Desktop virtualization must increase as far as improvements in local and wide area connectivity are implemented. X86 keeps as the traditional architecture, however new trends in technology opens the near future insertion of new platforms, such as GPU's, APU's and ARM (RISC)
 - **Software:** Institutional licensing is recommended and soon will be mandatory. Those packages not available in the UNAM's software store could be purchased individually.
 - **Networking:** Major investments are been made to improve connectivity to the Internet, also to provide better services locally, wired and wireless. Most of the campuses in the metropolitan area of Mexico City could be connected to the Metropolitan Delta and associated to NIBA (National Network for Broadband Access) y collaboration with CUDI, local and federal government.



Proyectos y perspectivas

- **LANCAD: Laboratorio Nacional de Cómputo de Alto Desempeño (UAM – CINVESTAV – UNAM).** *Propuesta de expansión*
- **Delta Metropolitana: Fibra oscura en la Ciudad de México (UAM – CINVESTAV – UNAM).** *Propuesta de expansión - NIBA*
- **Especialización en Cómputo de Alto Desempeño.** *UNAM 2013.*
- **Programa nacional de formación de recursos humanos especializados en HPC – Supercómputo.** *Propuesta.*
- **Programa nacional de estímulos y plazas para la incorporación de técnicos especializados e investigadores.** *Propuesta*
- **GRID Nacional y compartición de recursos de hardware y software.** *Propuesta.*
- **HPC en apoyo a la investigación, el desarrollo industrial y comercial, desarrollo social.** *Propuesta.*
- **Nuevas tendencias y tecnologías:** Cómputo cognitivo, Inteligencia Artificial, HPC Verde, IHC, ICC, Realidad Virtual e Inmersiva, Big Data, Cómputo de Alto Rendimiento En Demanda (Nube de Supercómputo), Clústers compartidos, Scientific Gateway @MX, HPC IaaS. *Propuestas*
- **Difusión, extensión, cultura informática.** *Propuestas*