Grid computing and multiagent systems:

new direction of telemedicine development

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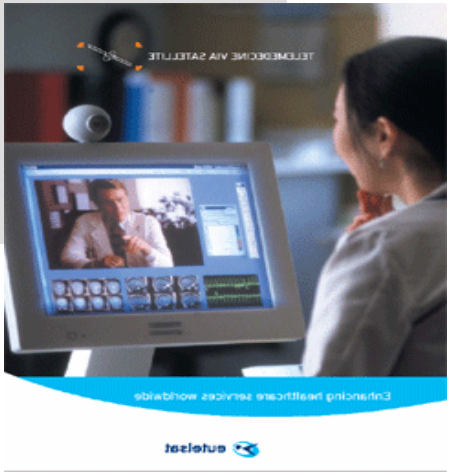
Fundamental directions of telemedicine development in Uzbekistan



create a

- country-wide telemedicine network
- system of tele-diagnostic services
- emergency telemedicine system
- system of continuous healthcare monitoring
- system of continuous tele-education for health care professionals

This system must to meet the following requirements:

- EFFICIENCY
- REAL-TIME INFORMATION
- FLEXIBLE AND UPGRADEABLE
- ELIMINATING GEOGRAPHY
- INTERFACE ISSUES
- TRIAGE DATA NEEDS

What is Telemedicine?

Telemedicine utilizes broadband satellite communications, the Internet and cellular technologies to allow field personnel in real-time to diagnose critical patient information with the assistance of medical specialist anywhere in the world. Think of it as video teleconfrencing with medical devices attached that can also be seen by people on both ends of the secure connection. The output of electronic stethoscopes, otoscopes, ultrasound imagery, EKGs and other medical equipment are sent instantaneous to a staff of collaborating doctors. Additionally, the collaborating medical professional can see and speak to patients half a world away.

ICT technologies are keys to

connecting people, information and research
to improve health in countries

Efficient e-Health services have already demonstrated their value.

eHealth

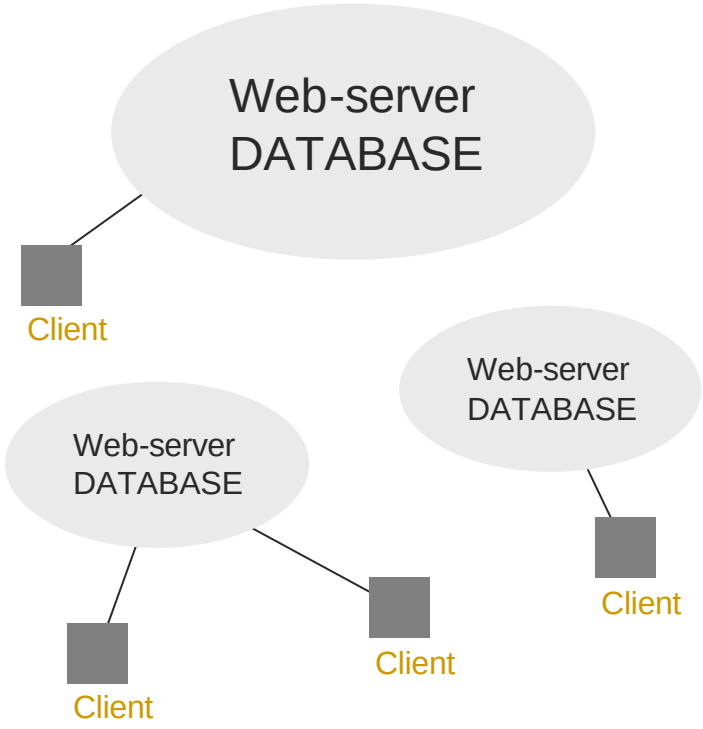
Physicians can take advantage of development of Internet for telemedicine services.

Most of the telemedicine projects are designed to allow the exchange of information between groups of healthcare professionals, in developed and/or developing countries.

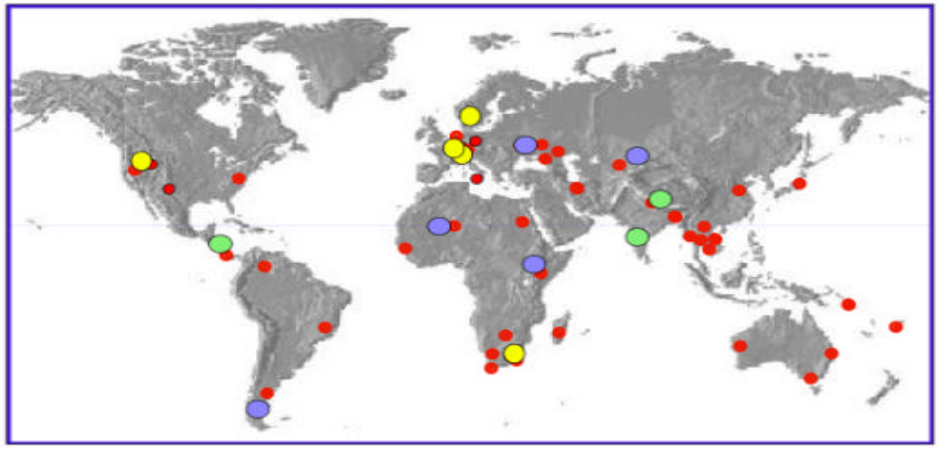
Such an exchange is very well

fitted to provide a second diagnosis

Multipoint dynamic **telemedicine networks**



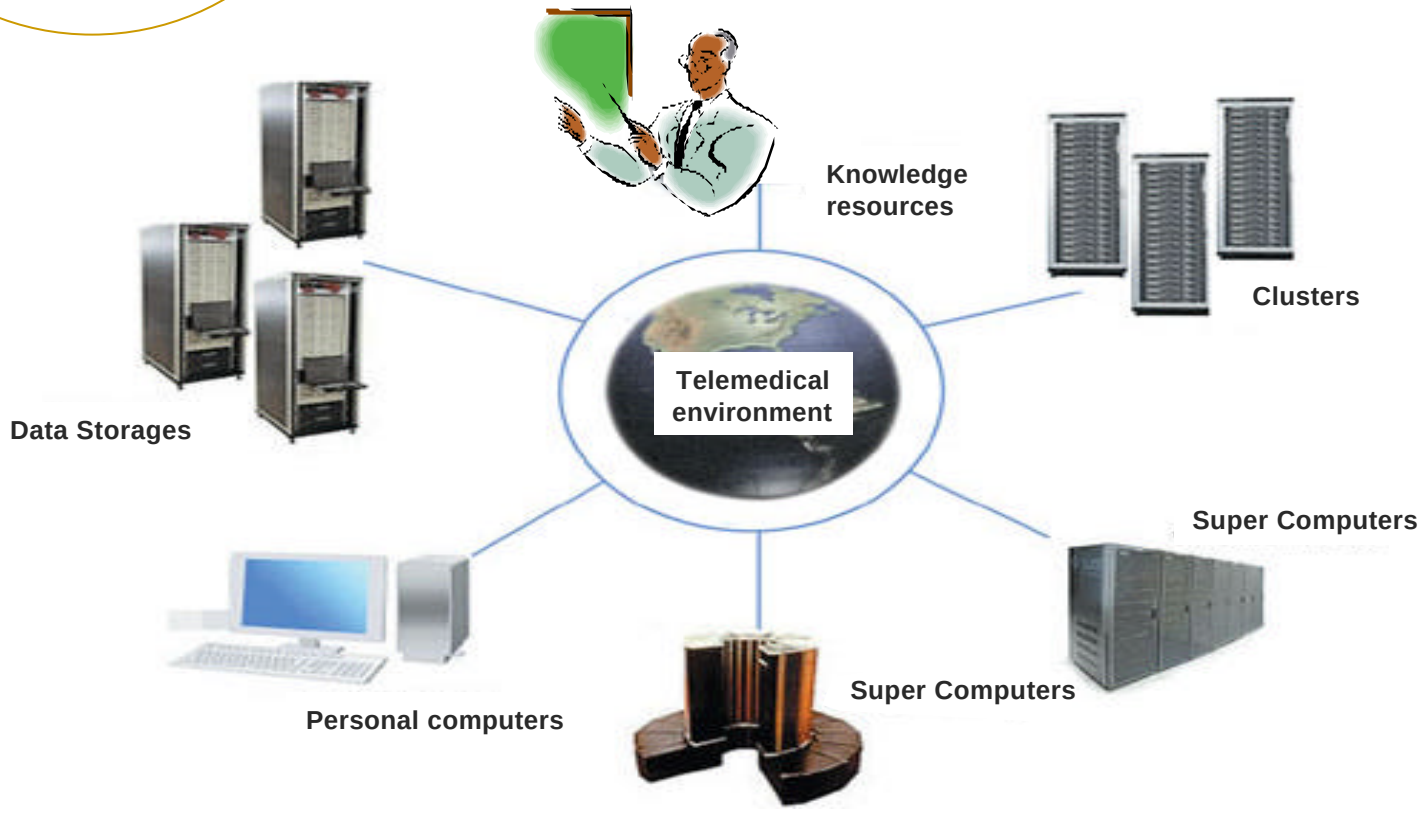
requires the further strengthening of collaboration



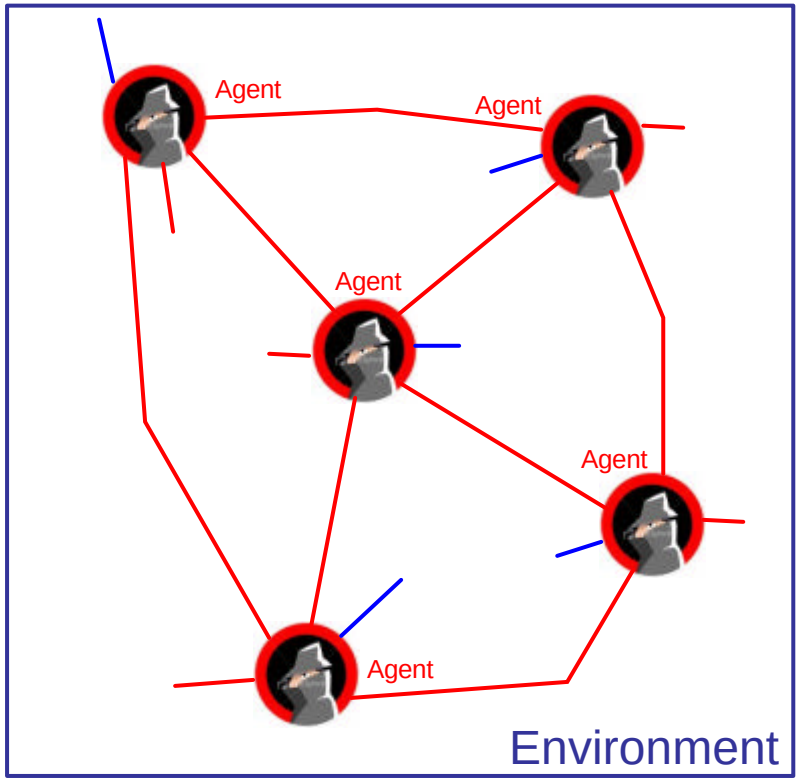
This requires moving away from the present central web server approach

To build up the date telemedical environment it's need to include not only data bases,

but all many different resources



multi-Agent systems



A **multi-agent system** is a system composed of multiple interacting intelligent agents. Multi-agent systems can be used to solve problems which are difficult or impossible for an individual agent or monolithic system to solve.

Intelligent agent is a software agent that assists users and will act on their behalf, in performing non-repetitive computer-related tasks, in the sense of a «representative agent», like an insurance agent or travel agent. Intelligent agents are used for operator assistance or data mining (sometimes referred to as bots). While they are often based on fixed pre-programmed rules, "intelligent" in this context is often taken to imply the ability to adapt and learn.

DREAMS ASIA PROJECT

Within framework of NATO grant DREAMS_ASIA [Development of gRid EnAbling technology in Medicine & Science for Central ASIA] under coordination of HealthGrid and in cooperation with Joint Institute of Nuclear Research (Russia) we has been started creation first grid node in Central Asia

The first step

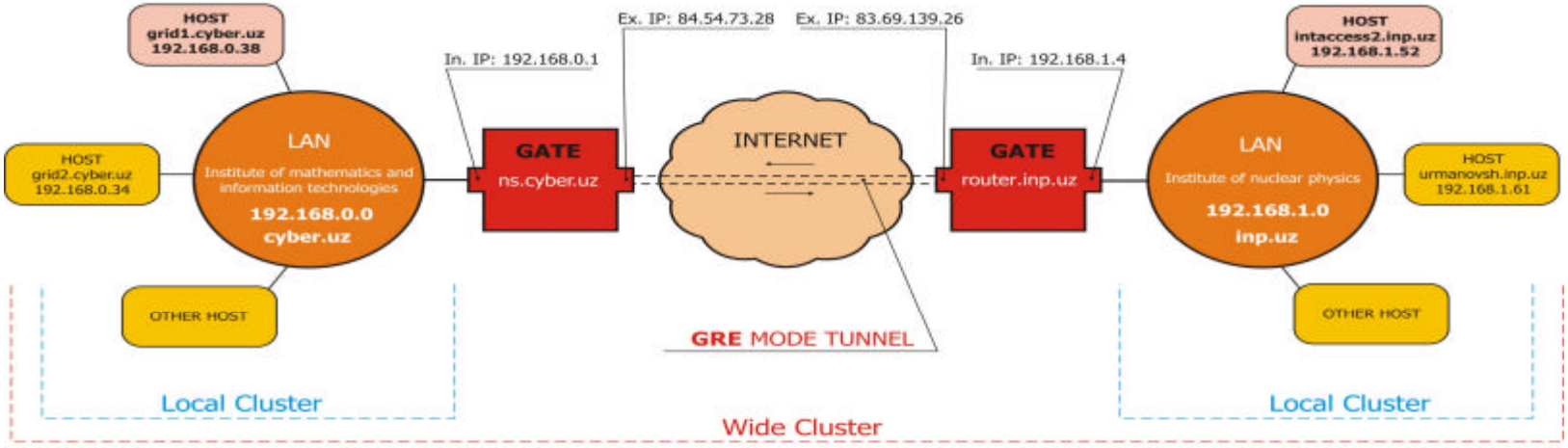
creation of local cluster in our institute.

Because technical re-equipment is a costly event, and funding very modest, the cluster was constructed on the basis of personal computers

DREAMS ASIA PROJECT

On the next stage our cluster was joined with the existent cluster of another participant of project - Institute of Nuclear Physics, NAS Uz

The scheme of our computer network



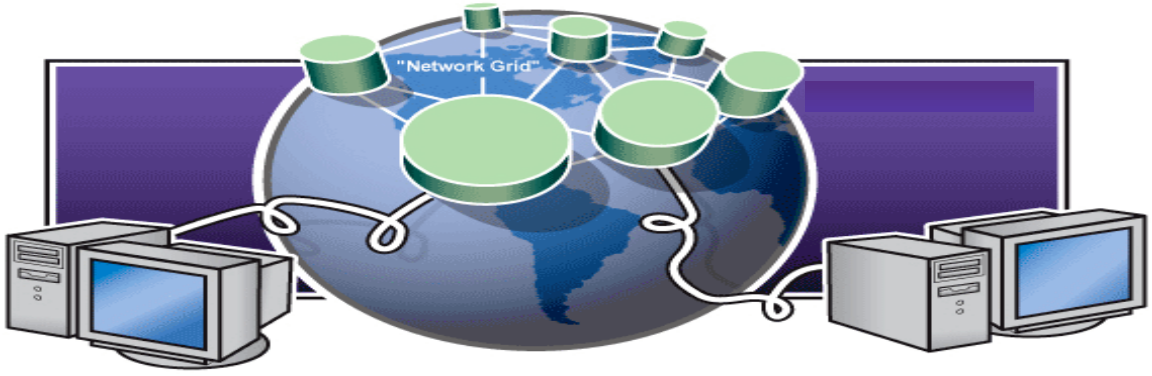
Both private networks are direct connected through the GRE mode tunnel

NFS is used as a distributed file system
MPICH-1.2.4 platform is used for parallel computing
Condor-6.8.8 serve as the tool for submit and managing the jobs
grid1.cyber.uz - Condor Central Manager of cyber.uz domain
intaccess2.inp.uz - Condor Central Manager of inp.uz domain

DREAMS ASIA PROJECT

Of course, launching infrastructure is not a GRID, at that the tasks, computing at this cluster, don't need in large scale resources. But it's only first step towards gridable telemedicine.

In this year, due to NATO grant «DREAMS_ASIA» we have been got new equipment. We plan to install on it gLite middleware and then to connect to JINR Grid-infrastructureas player and resource provider.



The challenges that have been faced in telemedicine application will be overcome by lower costs, better access, and better technologies. New challenges will arise and these to will be overcome, as there is a strong foundation in Uzbekistan for success.