Fault-Tracking in Computer Networks Using GIS

Supervised by:
Dr.Baqer Al-Ramadan

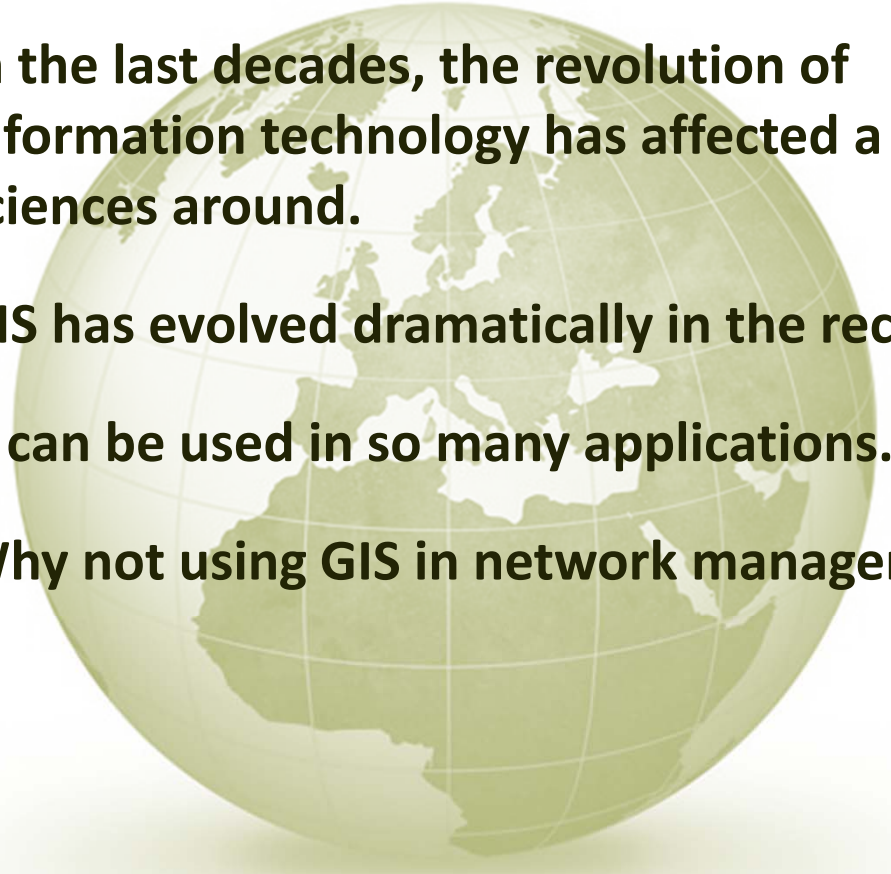
Prepared by:
Saeed Alsowail
Rashad Balfaqih

December 25th 2011

Outline

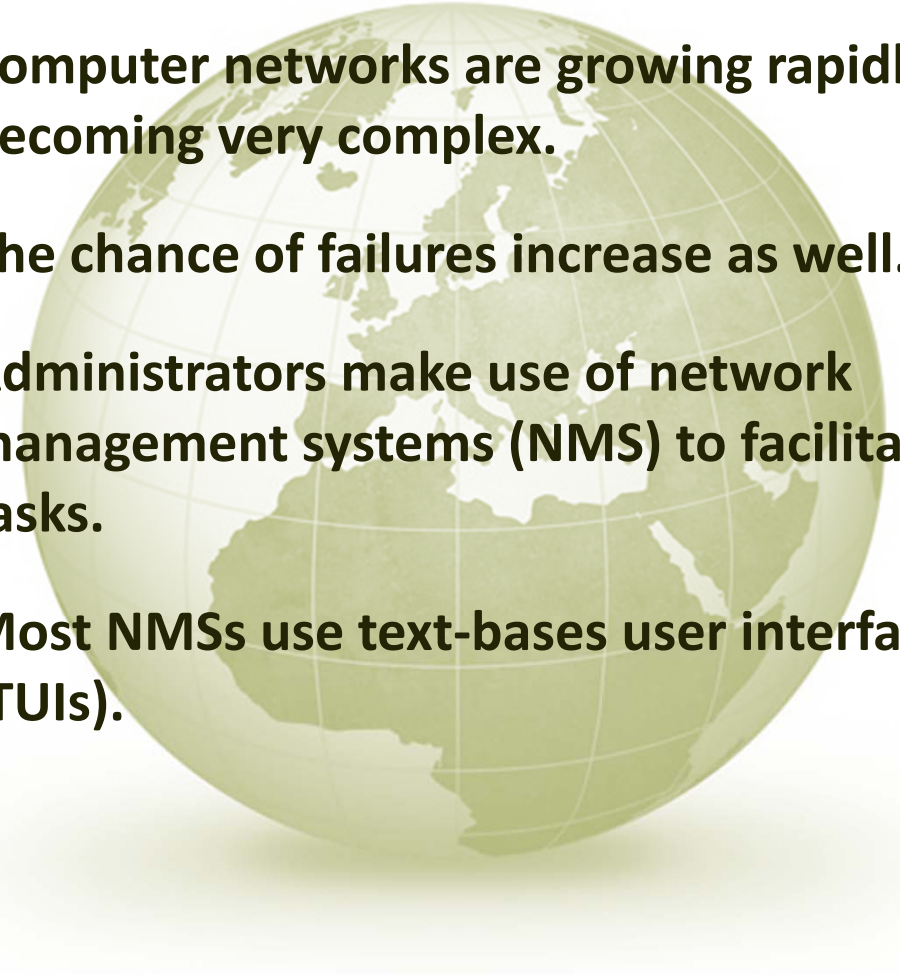
- Introduction
- Problem Statement
- Project Objective
- Tool Architecture & Design
- Functionality
- How the tool works
- Conclusion

INTRODUCTION



- In the last decades, the revolution of information technology has affected a lot of sciences around.
- GIS has evolved dramatically in the recent years.
- It can be used in so many applications.
- Why not using GIS in network management?

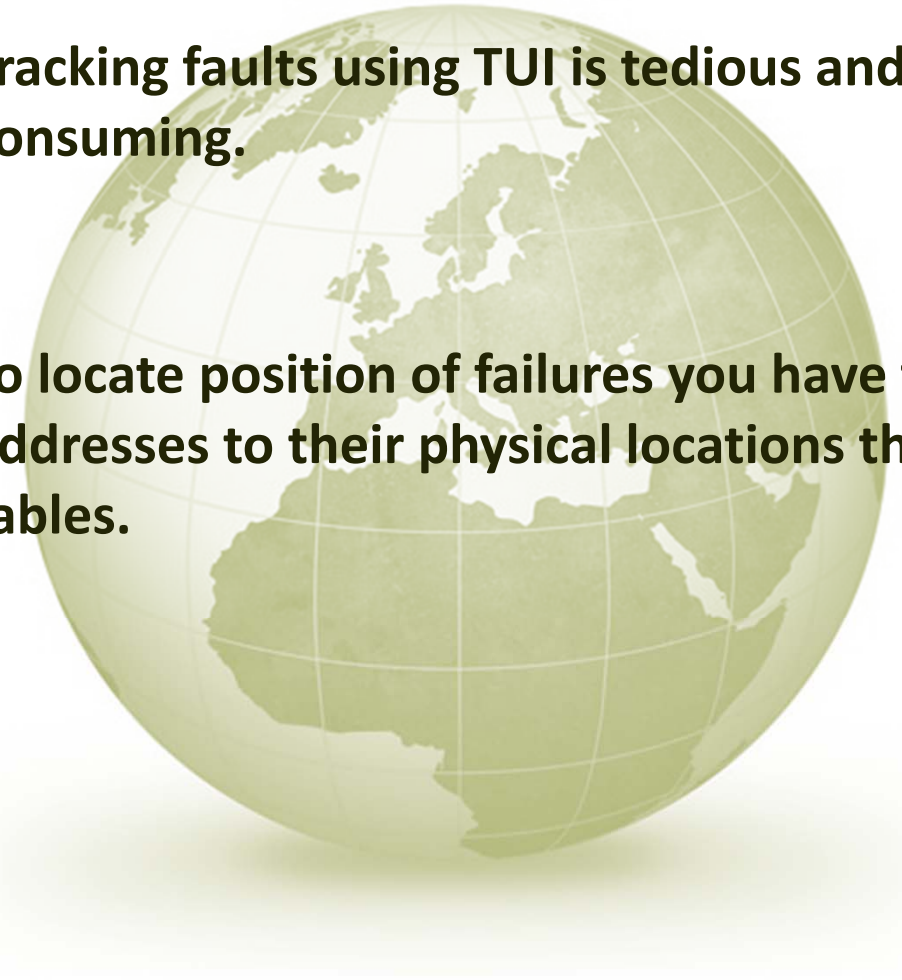
INTRODUCTION



- Computer networks are growing rapidly and becoming very complex.
- The chance of failures increase as well.
- Administrators make use of network management systems (NMS) to facilitate their tasks.
- Most NMSs use text-bases user interfaces (TUIs).

Problem Statement

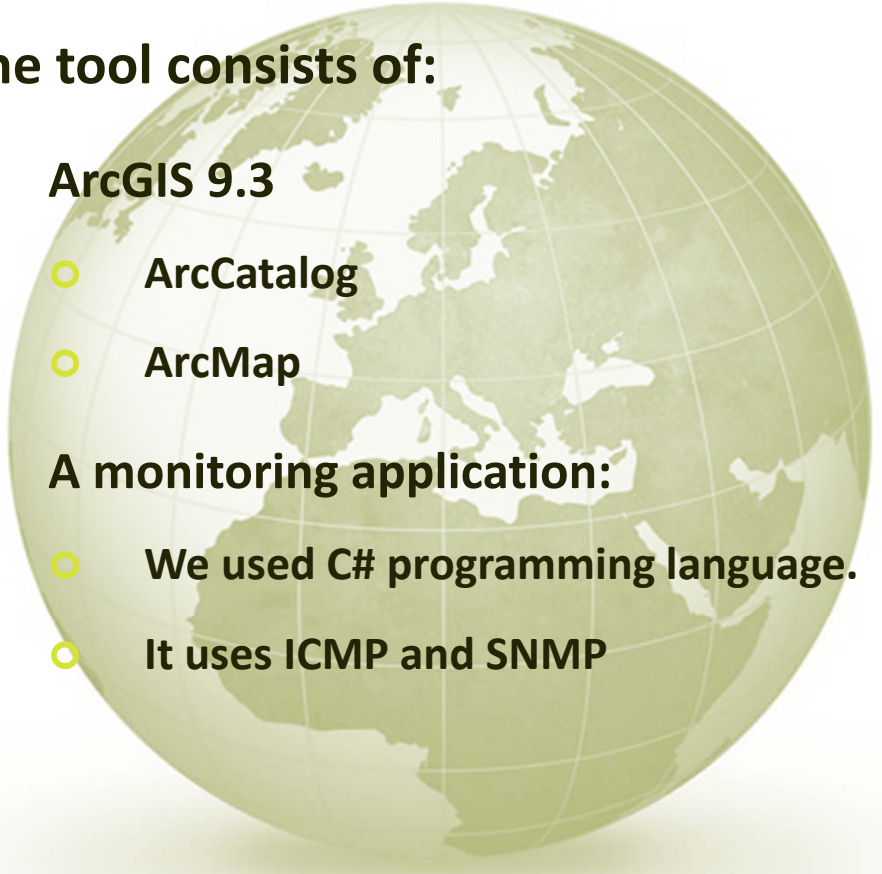
- **Tracking faults using TUI is tedious and time consuming.**
- **To locate position of failures you have to map IP addresses to their physical locations through tables.**



OBJECTIVE

- **In this project we are trying to build a tool that:**
  - **Use GIS to increase network management efficiency.**
  - **Integrate GIS with NMS to ease administrator's task.**

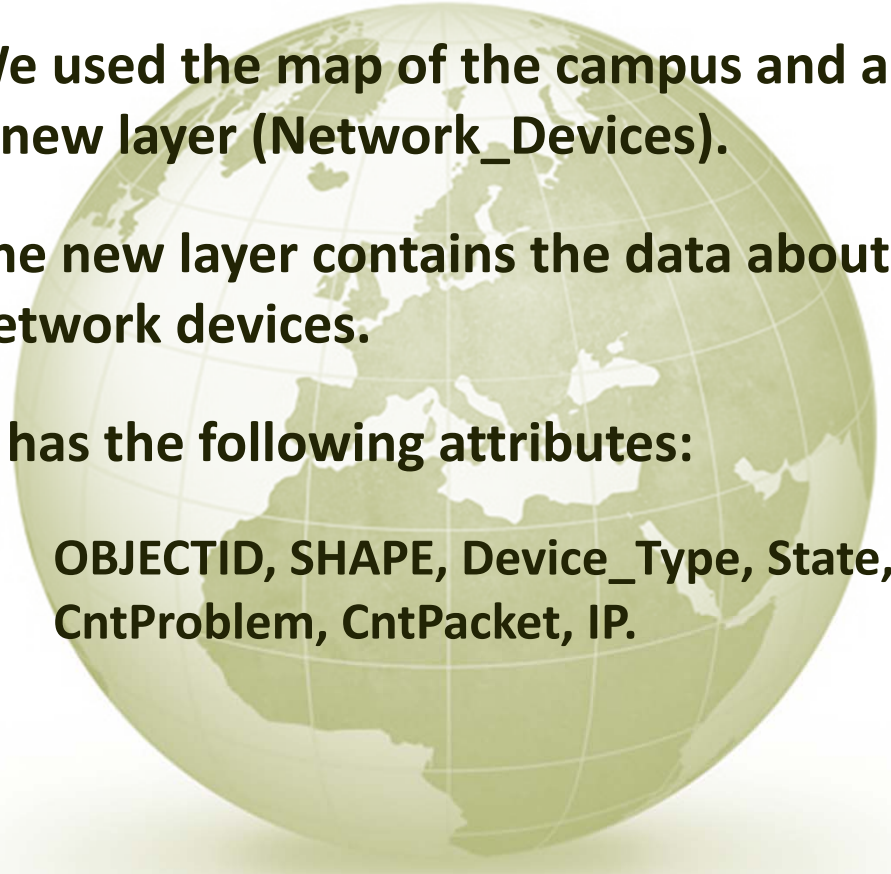
Tool Architecture & Design



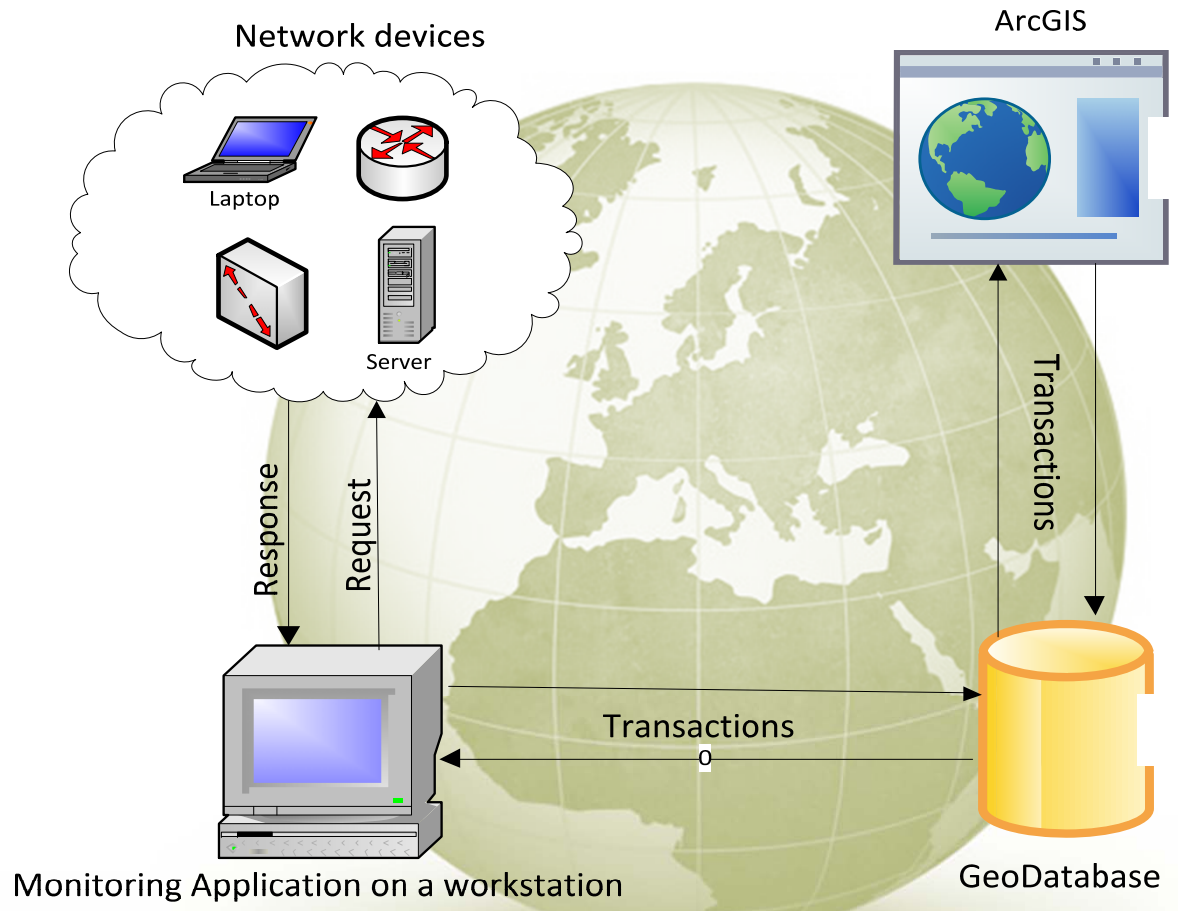
- The tool consists of:
  - ArcGIS 9.3
    - ArcCatalog
    - ArcMap
  - A monitoring application:
    - We used C# programming language.
    - It uses ICMP and SNMP

Tool Architecture & Design

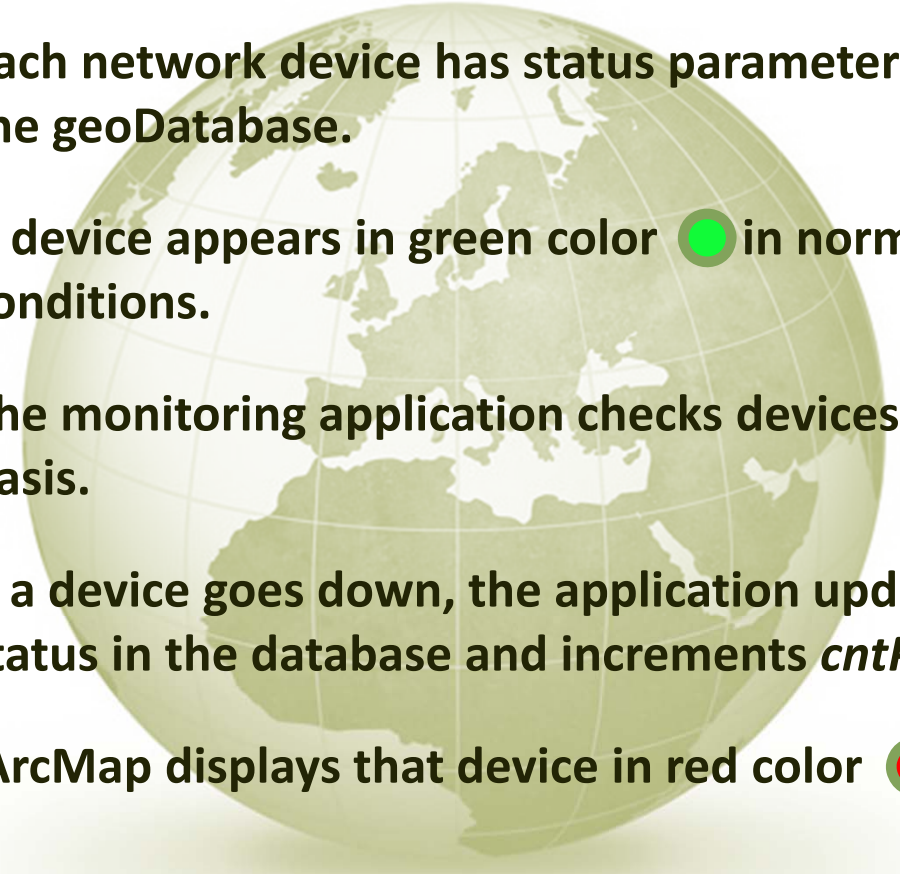
- We used the map of the campus and added to it a new layer (Network_Devices).
- The new layer contains the data about the network devices.
- It has the following attributes:
  - OBJECTID, SHAPE, Device_Type, State, Location, CntProblem, CntPacket, IP.



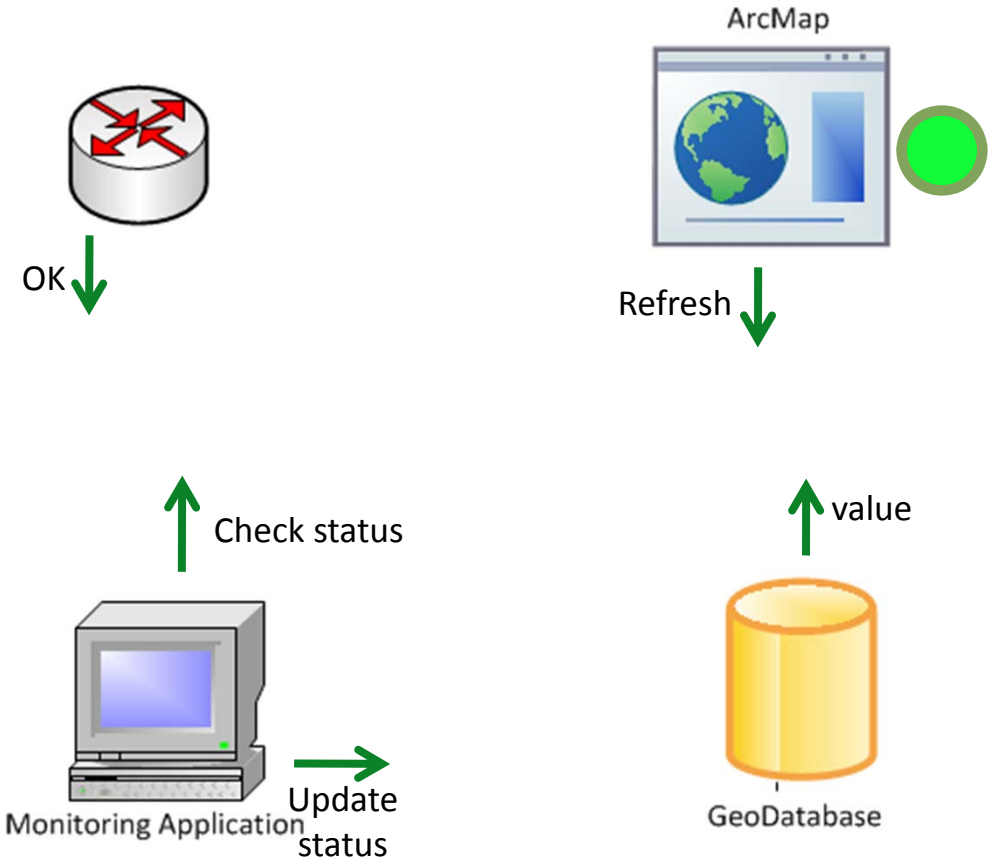
Tool Architecture & Design



FUNCTIONALITY

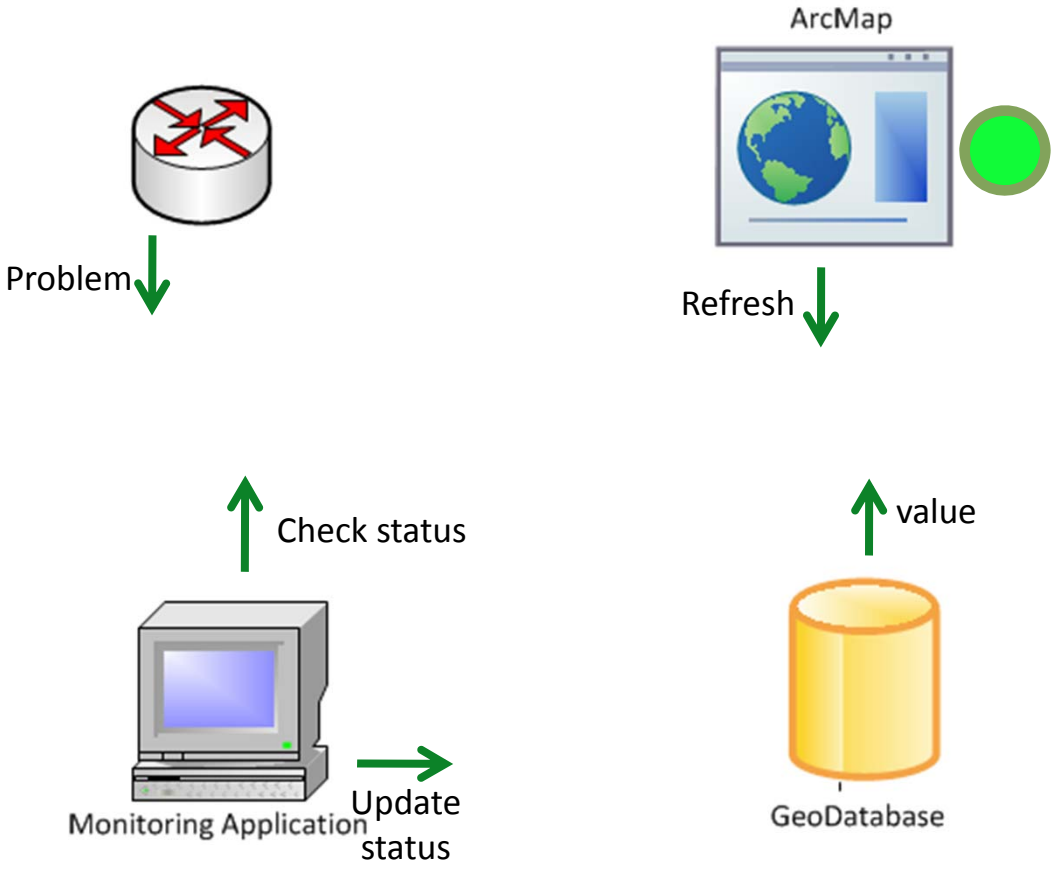


- Each network device has status parameters stored in the geoDatabase.
- A device appears in green color in normal conditions.
- The monitoring application checks devices on regular basis.
- If a device goes down, the application updates its status in the database and increments *cntProblem*.
- ArcMap displays that device in red color



How it works

Normal Condition (no problem found)



How it works

Problem Encountred

FUNCTIONALITY

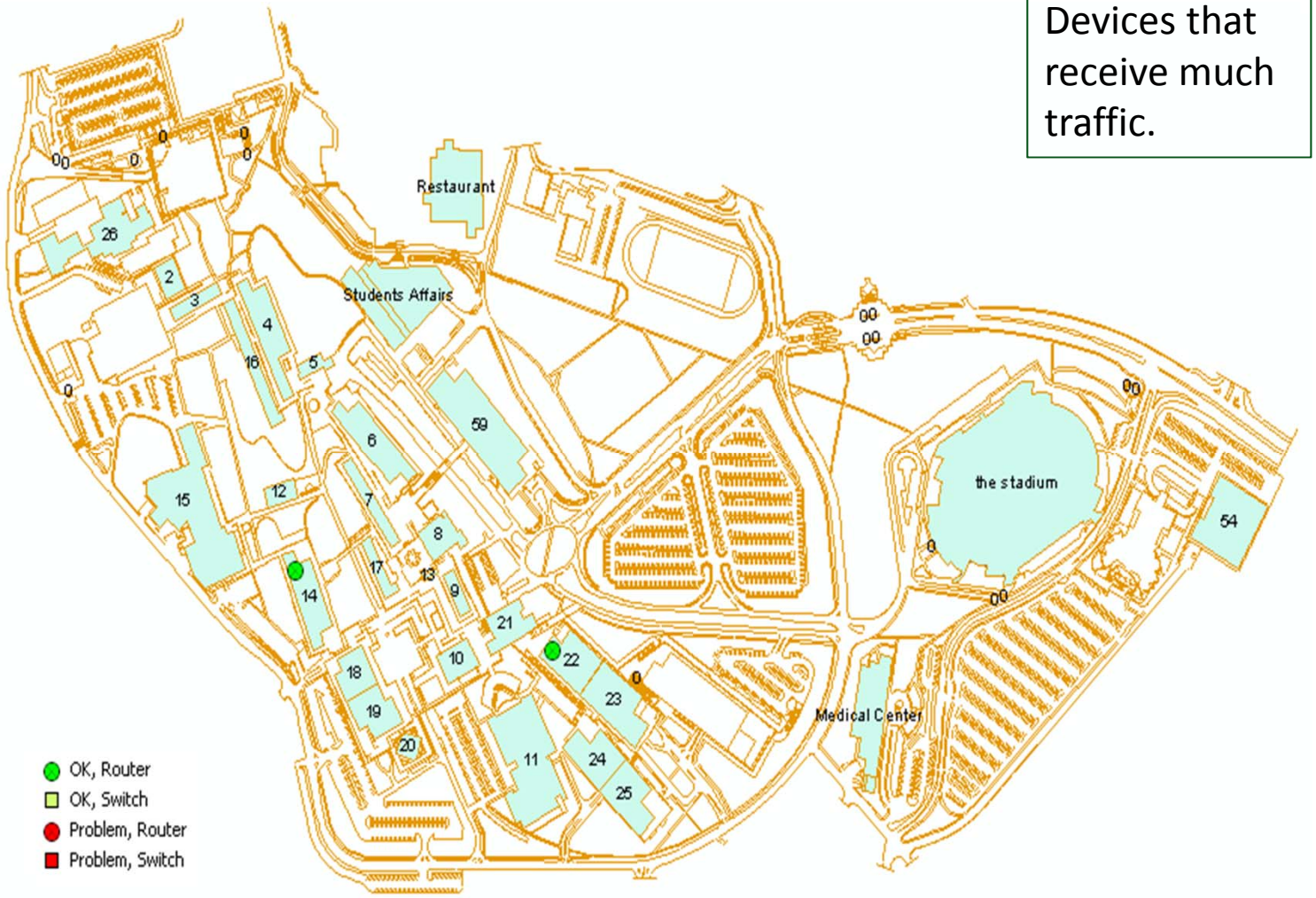
- In addition, we use ArcGIS to collect some performance statistics.
  - Frequent failures:
    - Devices that suffer intermittent problems can be identified through CntProblem attribute.
  - Overloaded devices:
    - Here, we can determine which device has a lot of traffic going through it (using SNMP).
    - This will help network administrator in decision making process about network improvements.

FREQUENT FAILURES

Devices that went down more than 3 times.

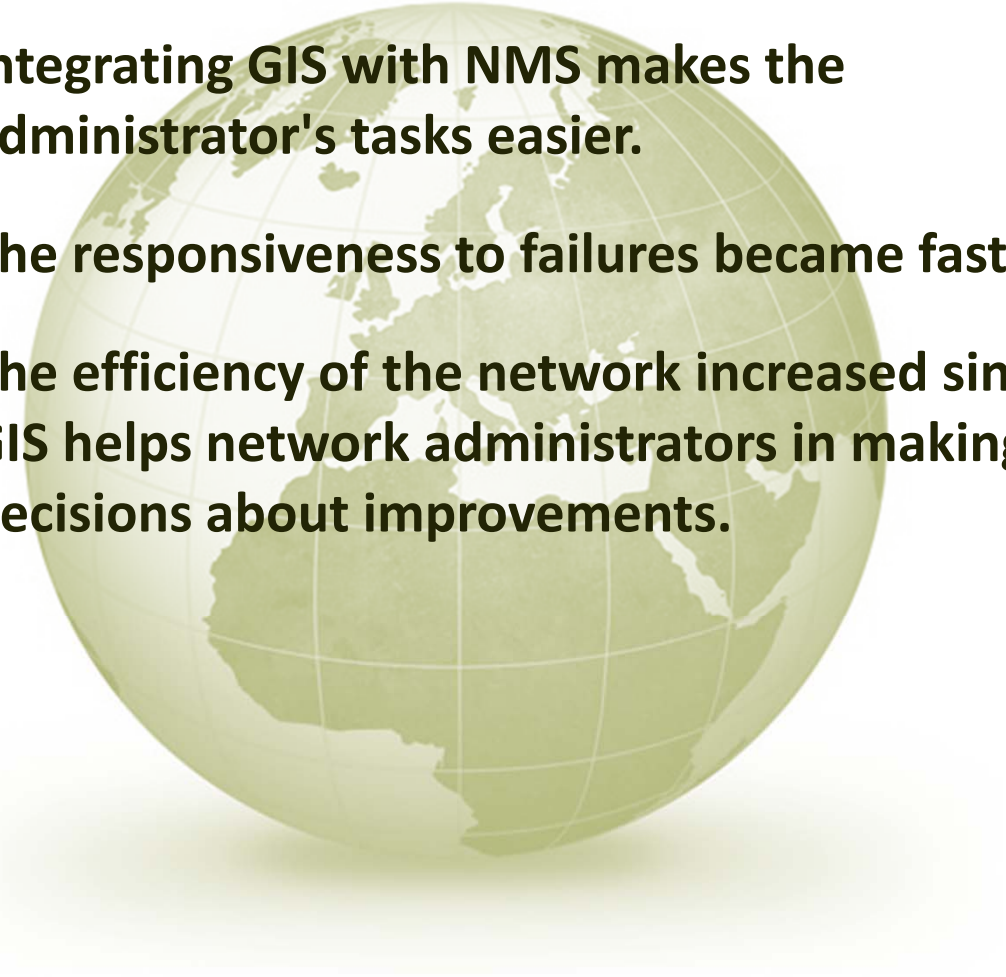
Overloaded Devices

Devices that receive much traffic.



THE NETWORK OF OUR CAMPUS

CONCLUSION



- Integrating GIS with NMS makes the administrator's tasks easier.
- The responsiveness to failures became faster.
- The efficiency of the network increased since GIS helps network administrators in making decisions about improvements.