Baltic DB & IS 2008

Tallinn University of Technology

Is the Scanning of Computer Networks Dangerous?

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The talk is about...

- The need of network scanning, its main principles and related problems

- A freely available network scanning tool, which can be used in practice, and its design – Angry IP Scanner

Scanning of computer networks

- Examining a single network address
- **Searching for addresses with specific properties**
- **IP Scanning involves**
  - Pinging
  - Port scanning
  - Gathering of other information

Typical gathered information

- Alive/dead status
- Average packet roundtrip time
- TTL – distance (in number of routers)
- Host and domain names
- Open and filtered TCP and UDP ports
- Running services and their versions
- OS type and version
- Much more info can be obtained indirectly

Scanning purposes

- **Offensive**
  (Attacks)
- **Defensive**
  (Preventive defense)
- **Maintenance**
  (Monitoring and inventory)

Legal issues

☒

- Most countries' laws forbid
  - getting illegal access to data,
  - destroying, spoiling, modifying it,
  - or reducing its usefulness or value in any other way

☑

- Scanning results provide
  - mostly publicly available and freely available information
  - **therefore it is legal**
  - with the probable exception of some 'more advanced' scanning techniques

Safety

- How safe is it to perform scanning nowadays?
  - legal, but may cause problems
- Are such tools dangerous for the humanity?
  - best tools for maintaining security are the same ones that can be used in preparation for attacks

State of Internet security

- Foundation protocols are old
  - there have been more trust before
- Present-day Internet is insecure
  - too much anonymity
  - weak authentication (passwords)
  - vulnerable routing and DNS
  - low-quality software
  - human factor (social engineering, mistakes, lack of knowledge and skills)

Angry IP Scanner

- Open source
- GPL
- Cross-platform
- User-friendly
- Extensible
- (Nice name)

Technological choices

Java

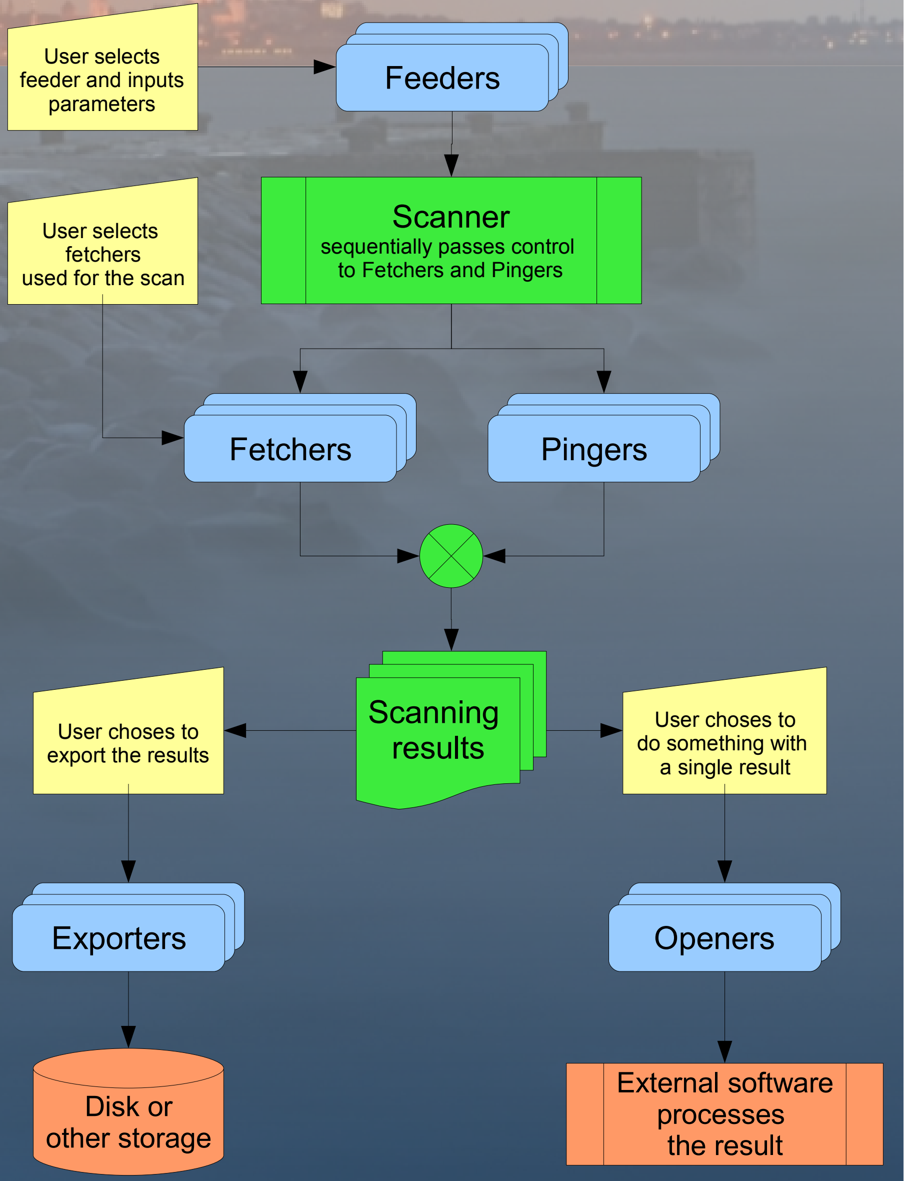
- modern and popular, now open-source
- productive
- portable, cross-platform
- JNI (Java Native Interface)

SWT

- open source
- good performance
- native look and feel on all platforms

Modularity and Extensibility

- Modular design
- Possibility of plugins
  - Feeders
    generate addresses for scanning
  - Pingers
    check the alive status
  - Fetchers
    retrieve info about each address
  - Exporters
    store the scanning results
  - Openers
    open addresses in other software



User selects feeder and inputs parameters
Feeders
User selects fetchers used for the scan
Scanner
sequentially passes control to Fetchers and Pingers
Fetchers
Pingers
Scanning results
User choses to export the results
User choses to do something with a single result
Exporters
Openers
Disk or other storage
External software processes the result

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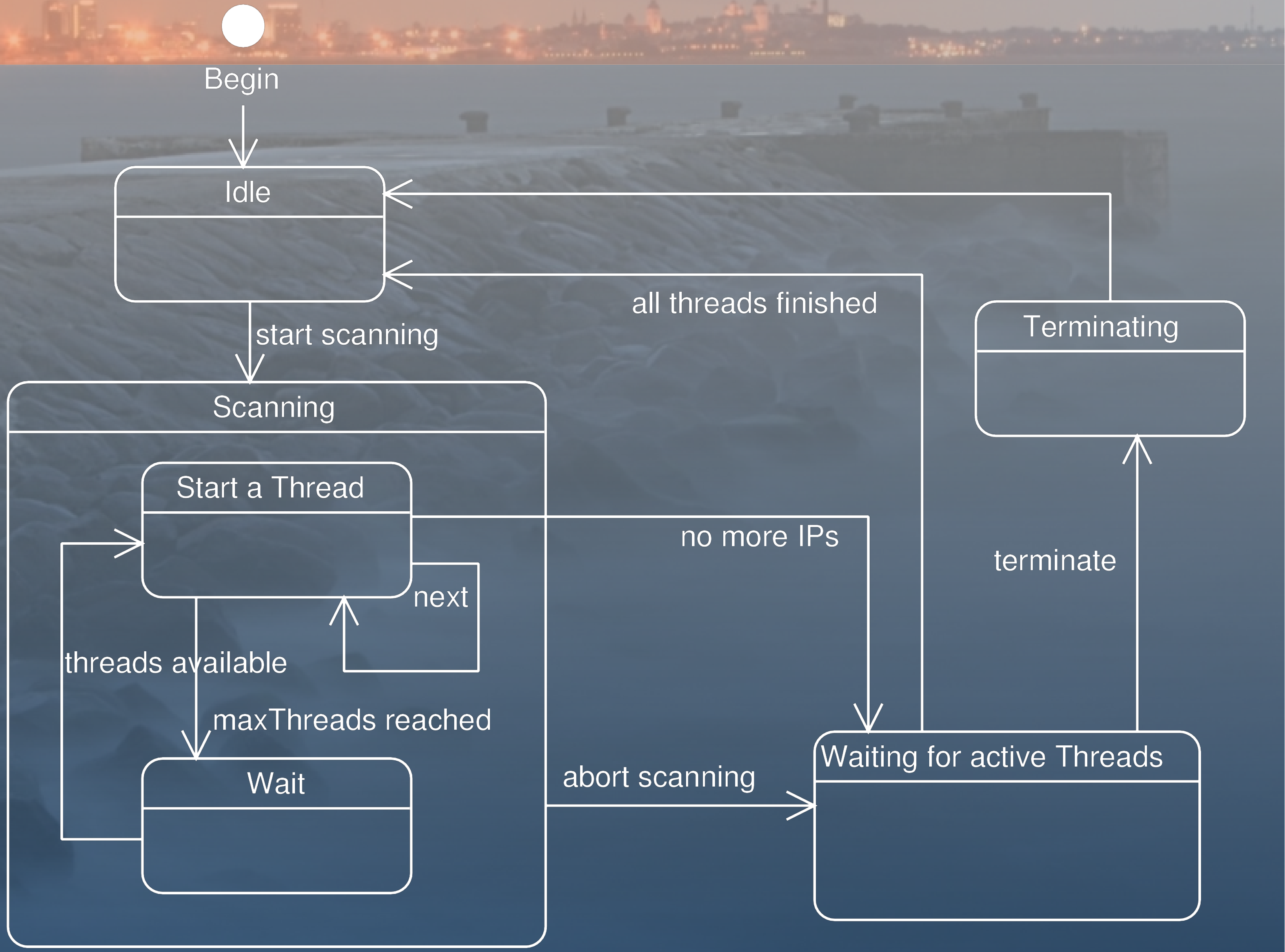
Increasing performance

- Parallelizing
- Adapted timeouts
- Thread pooling
- Speed-accuracy compromise
- SYN-ACK-RST scanning

Simplified state diagram



Platform support

- Linux
  - primary development platform
  - best choice for scanning
- Mac OS X
  - based on FreeBSD kernel
  - lots of conceptual differences
- Windows
  - support due to popularity
  - inferior to anything else out there

Deployment

- One-file executable (jar)
- Separate for each platform
  - Linux: rpm & deb
  - Mac: application bundle
  - Windows: exe
- Automatically extracts native libraries (.dll and .so)
- Size < 1 Mb

Comparison with other tools

- Nmap
  - Probably the most popular scanner
  - Has some 'more advanced' tricks
  - Windows support is fairly new
  - Harder to use
  - Requires proper installation
- Angry IP Scanner
  - No installation necessary
  - Runnable from USB drives
  - GUI by design – ease of use
  - Superior extensibility via plugins
- **No other comparable general-purpose, open-source and cross-platform scanners**

Problems (1)

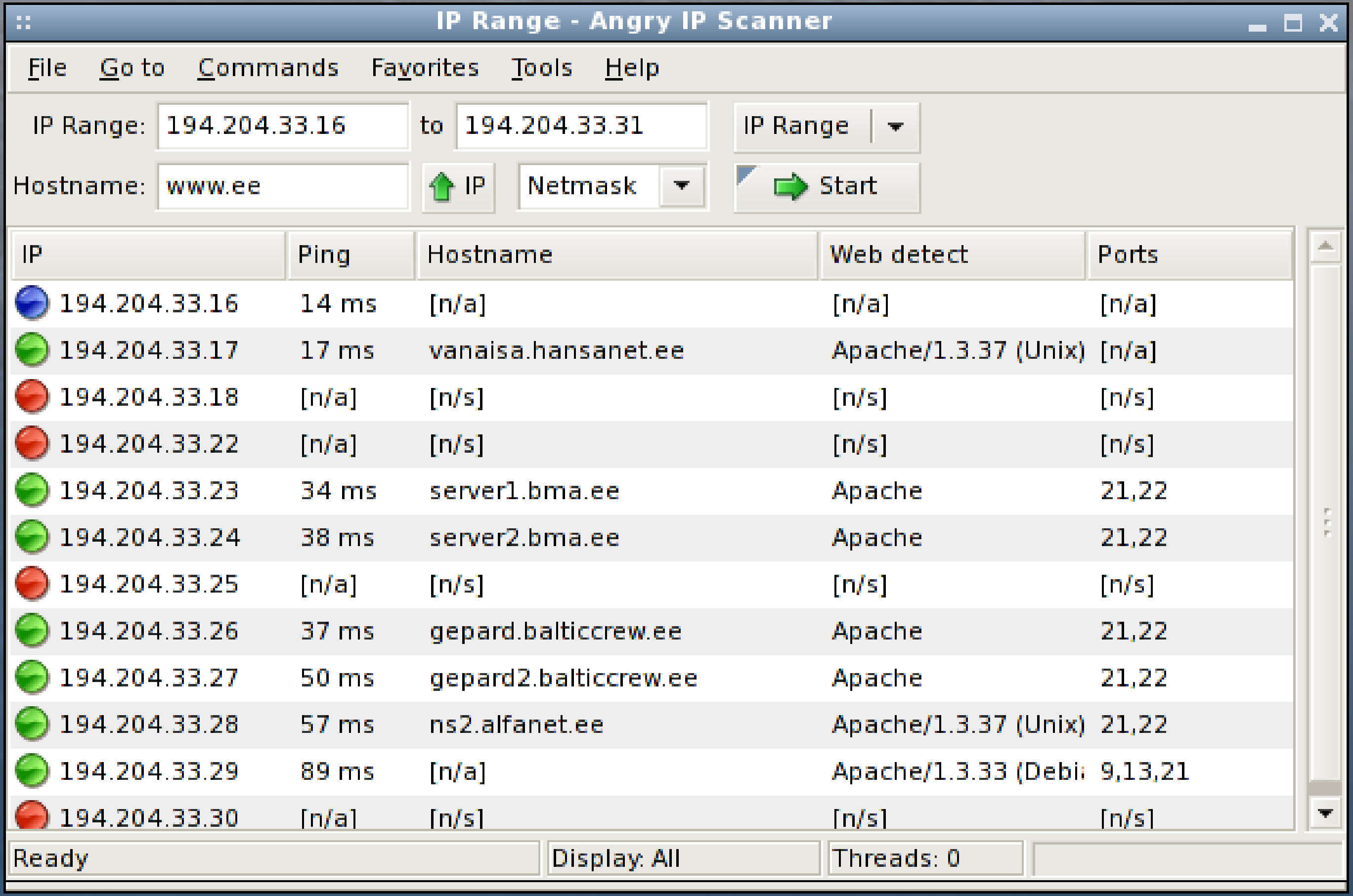
- Many low-quality clones
  - Angry IP Scanner was the first general-purpose GUI scanner
- Anti-virus software
  - nowadays AV vendors tend to enlarge their databases at any price
  - they take users' freedom away (even more than Microsoft does)

Problems (2)

- Windows >= XP SP2
  - Used by ~70% of users (unfortunately)
  - Removed raw socket support
    - hard to do more exotic things
  - TCP connection rate limiting
    - max 10 simultaneous connection attempts (max 2 in some Vista editions)
    - very slow scanning performance

Results (1)

Working software



IP Range: 194.204.33.16 to 194.204.33.31

Hostname: www.ee

Netmask

IP	Ping	Hostname	Web detect	Ports
🔵 194.204.33.16	14 ms	[n/a]	[n/a]	[n/a]
🟢 194.204.33.17	17 ms	vanaisa.hansanet.ee	Apache/1.3.37 (Unix)	[n/a]
🔴 194.204.33.18	[n/a]	[n/s]	[n/s]	[n/s]
🔴 194.204.33.22	[n/a]	[n/s]	[n/s]	[n/s]
🟢 194.204.33.23	34 ms	server1.bma.ee	Apache	21,22
🟢 194.204.33.24	38 ms	server2.bma.ee	Apache	21,22
🔴 194.204.33.25	[n/a]	[n/s]	[n/s]	[n/s]
🟢 194.204.33.26	37 ms	gepard.balticcrew.ee	Apache	21,22
🟢 194.204.33.27	50 ms	gepard2.balticcrew.ee	Apache	21,22
🟢 194.204.33.28	57 ms	ns2.alfanet.ee	Apache/1.3.37 (Unix)	21,22
🟢 194.204.33.29	89 ms	[n/a]	Apache/1.3.33 (Debi	9,13,21
🔴 194.204.33.30	[n/a]	[n/s]	[n/s]	[n/s]

Ready | Display: All | Threads: 0

(primary measure of success)

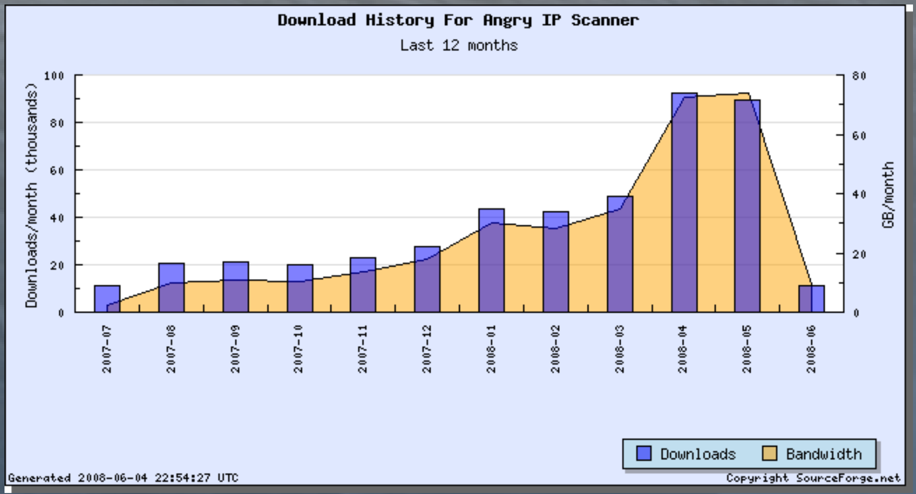
Results (2)

- Official homepage: http://www.azib.net/ipscan/
  - 10000 page views /day
  - 3000 downloads /day
  - The first ‘**ip scanner**’ in Google!
- Project homepage: http://sourceforge.net/projects/ipscan/
  - Subversion: version control
  - Bug and feature tracking
  - Forums

Results (3)

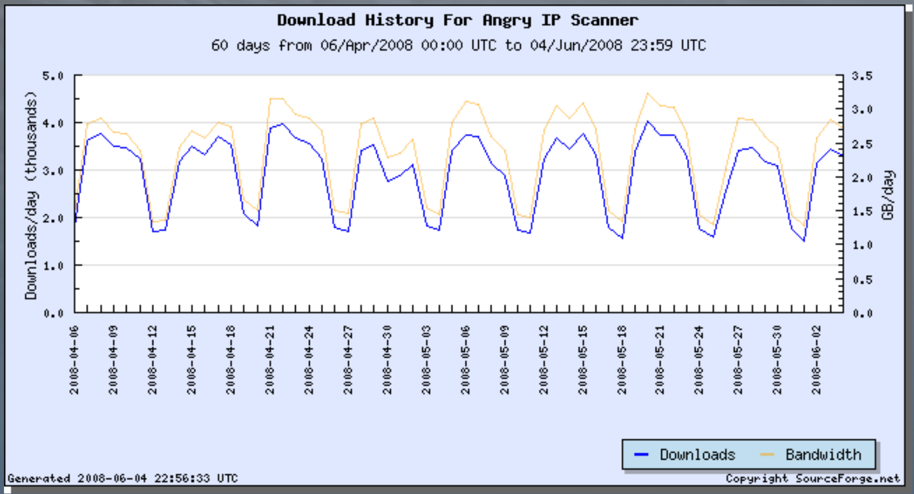
Download history of Angry IP Scanner *

Last **12** months



Increasing trend
(June stats are incomplete)

Last **2** months



Less downloads during weekends - people use it at work

* These stats reflect only downloads from sourceforge servers, but the application is widely mirrored on many 3rd-party software download sites

Now & Future

- Continue the development
  - more functionality
    (OS fingerprinting, version detection, stealth scanning, etc)
  - bugfixing
- Involve more people
  - better documentation
  - wiki-based homepage
  - more example plugins

Scanning of computer networks

Live demo
&
Questions!