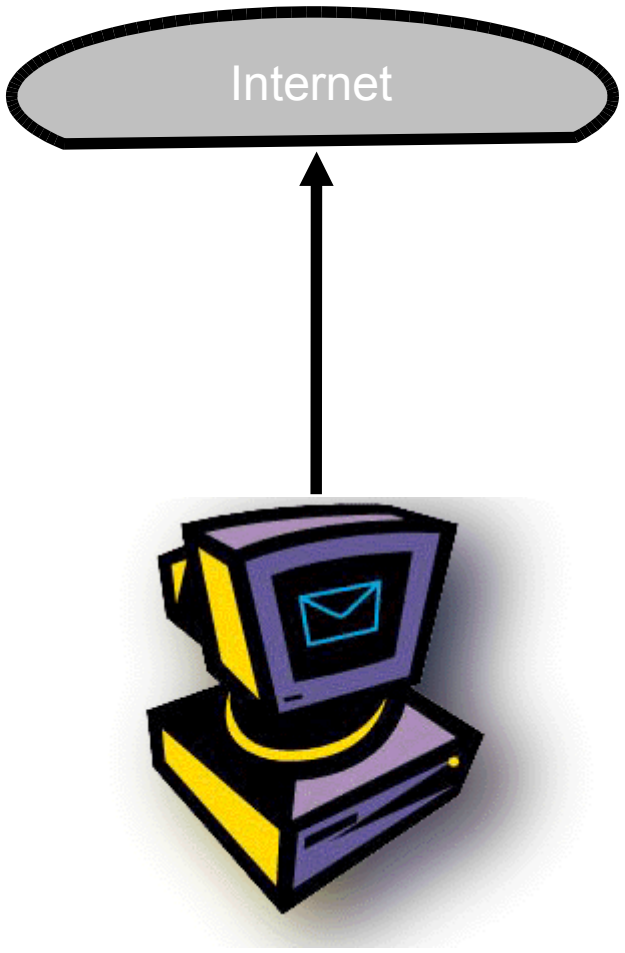
Open Source Quality of Service (QoS)

Traffic shaping

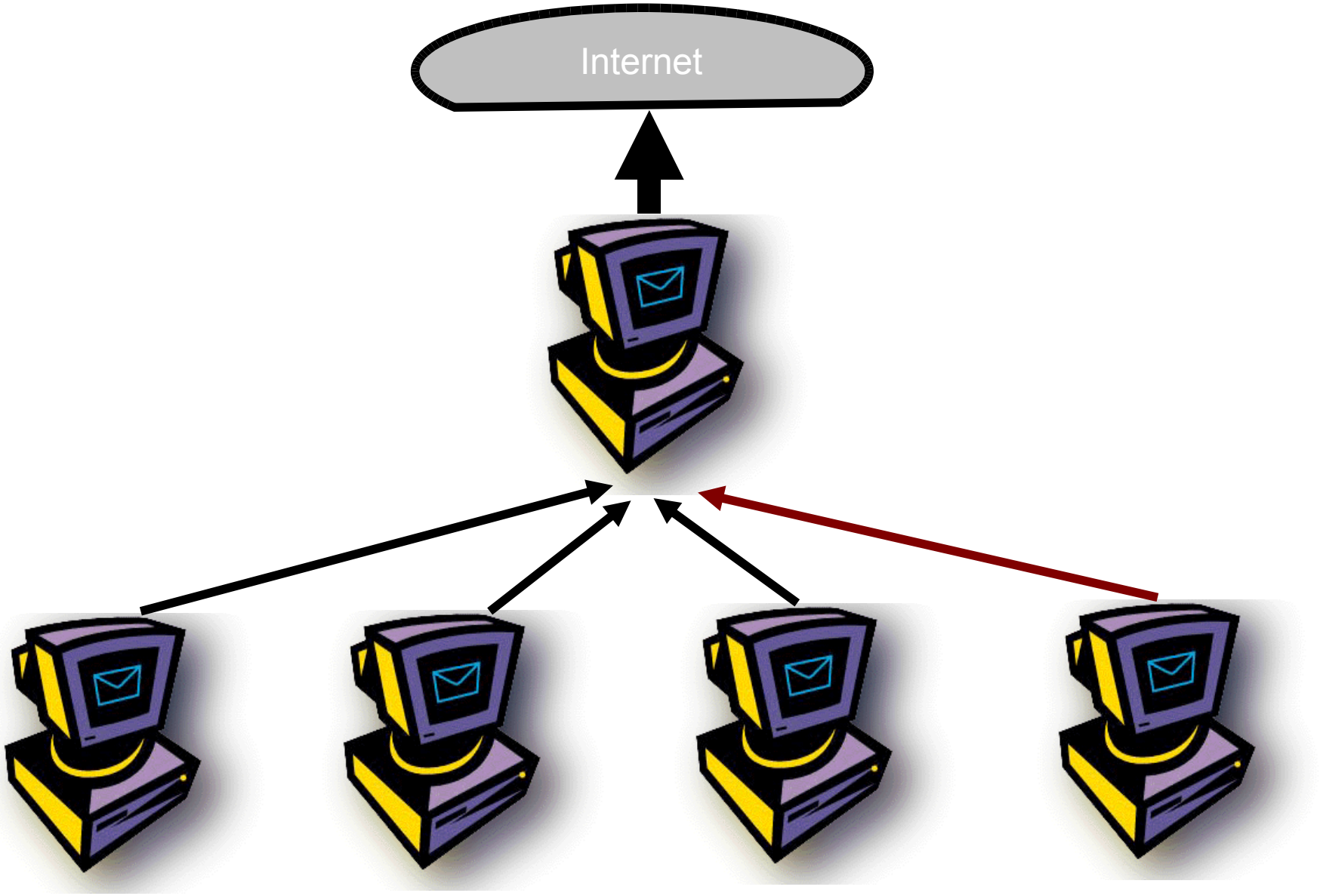
Vlatko Kosturjak



PRIORITET

Telnet
SSH
...

FTP
HTTP
P2P
...



What is QoS? (http://www.objs.com/survey/QoS.htm)

There is no common or formal definition of QoS. However, there are a number of definitions at the communication level where the notion originated to describe technical characteristics of mainly non-time-dependent data transmission. Emerging networks such as ATM, can provide QoS guarantees on bandwidth and delay for the transfer of continuous media (CM) data.

* The International Telecommunication Union (ITU) standard X.902, Information technology \x{FFFD} Open distributed processing \x{FFFD} Reference Model, refers to QoS as "A set of quality requirements on the collective behavior of one or more objects." A number of QoS parameters describe the speed and reliability of data transmission, e.g., throughput, transit delay, and error rate.
* The ATM Lexicon defines QoS as "A term which refers to the set of ATM performance parameters that characterize the traffic over a given virtual connection." QoS parameters apply mostly to lower level protocol layers, and were not meant to be directly observable or verifiable by the application. These parameters include cell loss ratio, cell error rate, cell misinsertion rate, cell delay variation, cell transfer delay, and average cell transfer delay. Five service classes are defined in terms of QoS parameters. Class 0 refers to best effort service in which no specific traffic parameters and no absolute guarantees are provided.
* Recently the Internet Engineering Task Force (IETF) has begun to address QoS issues for ATM. RFC 1946, Native ATM Support for ST2+, states "As the demand for networked real time services grows, so does the need for shared networks to provide deterministic delivery services. Such deterministic delivery services demand that both the source application and the network infrastructure have capabilities to request, setup, and enforce the delivery of the data. Collectively these services are referred to as bandwidth reservation and Quality of Service (QoS)." RFC 1932, IP over ATM: A Framework Document, states "QoS parameters [for real-time applications] are assumed to precede traffic in RSVP or be carried in some form within the traffic itself." "Work in progress is addressing how QoS requirements might be expressed and how the local decisions might be made as to whether those requirements are best and/or most cost effectively accomplished using ATM or IP capabilities." RSVP is discussed further below.

The IEEE paper, Distributed Multimedia and Quality of Service: A Survey, provides a more general definition of QoS for applications that must communicate in real-time: "The set of those quantitative and qualitative characteristics of a distributed multimedia system, which are necessary in order to achieve the required functionality of an application." This paper also provides a model of QoS processing for multimedia systems which we will generalize below to include applications requiring Internet services. Several research groups are investigating QoS support for the WWW, in particular, researchers at BBN, the Distributed Systems Technology Centre, and Washington University. These and other QoS-based projects are summarized below.

QoS izbor

- Hardware “Black Box”
- Software
  - Close
  - Open
    - Kernel (QoS, Qlinux, ...)
    - Proxy (Squid, Apache mod_throttle, ...)
    - ...

Linux QoS

- Tehnologija unutar Linuxovog kernela
  - Kernel + userland
- Internel Protokol (IP)
- Raspoređivanje paketa po prioritetima (queing discipline)
- Kernel
  - 2.4.x
  - 2.6.x
- Podrška za QoS svjesne aplikacije

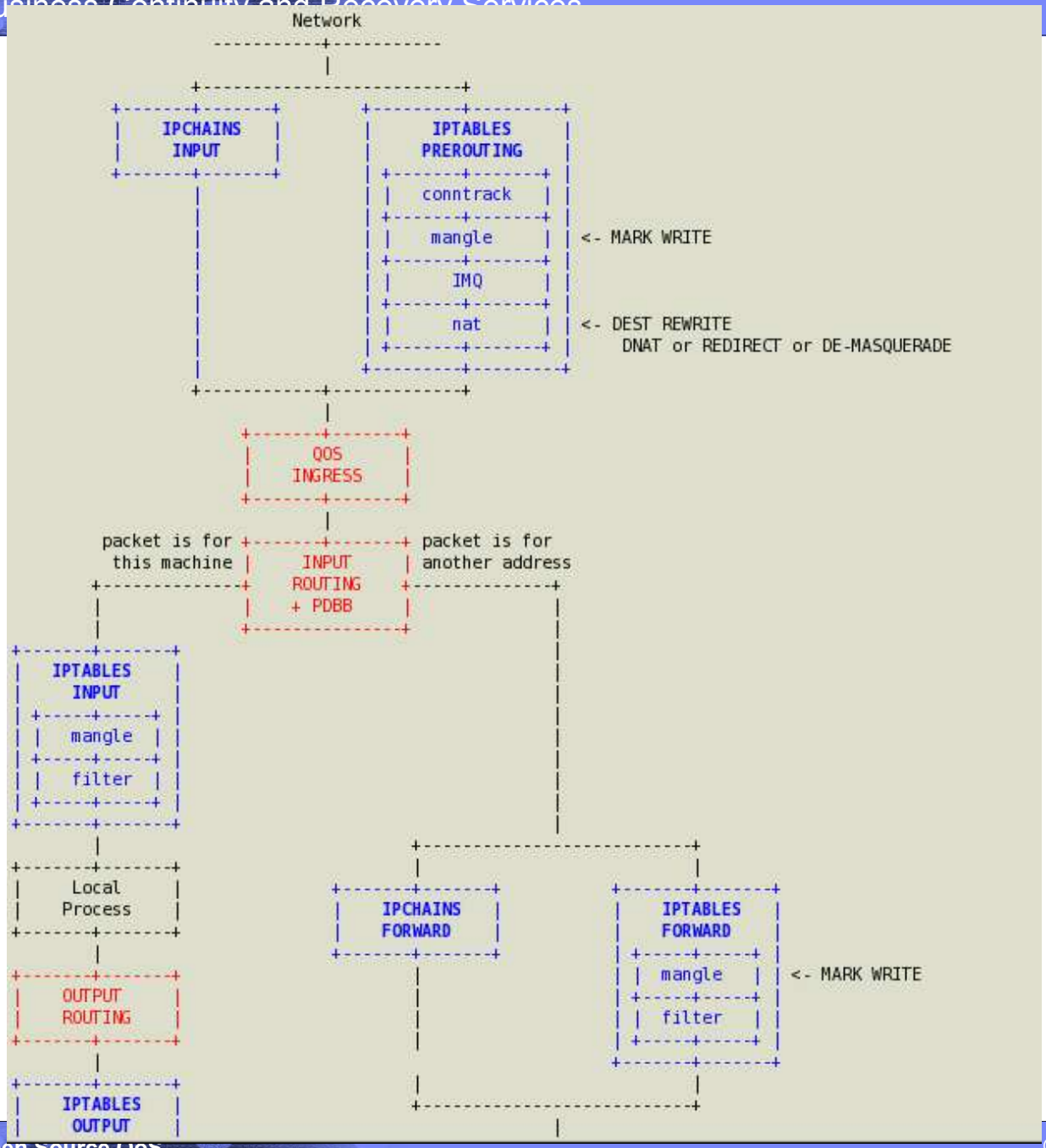
Što sve treba?

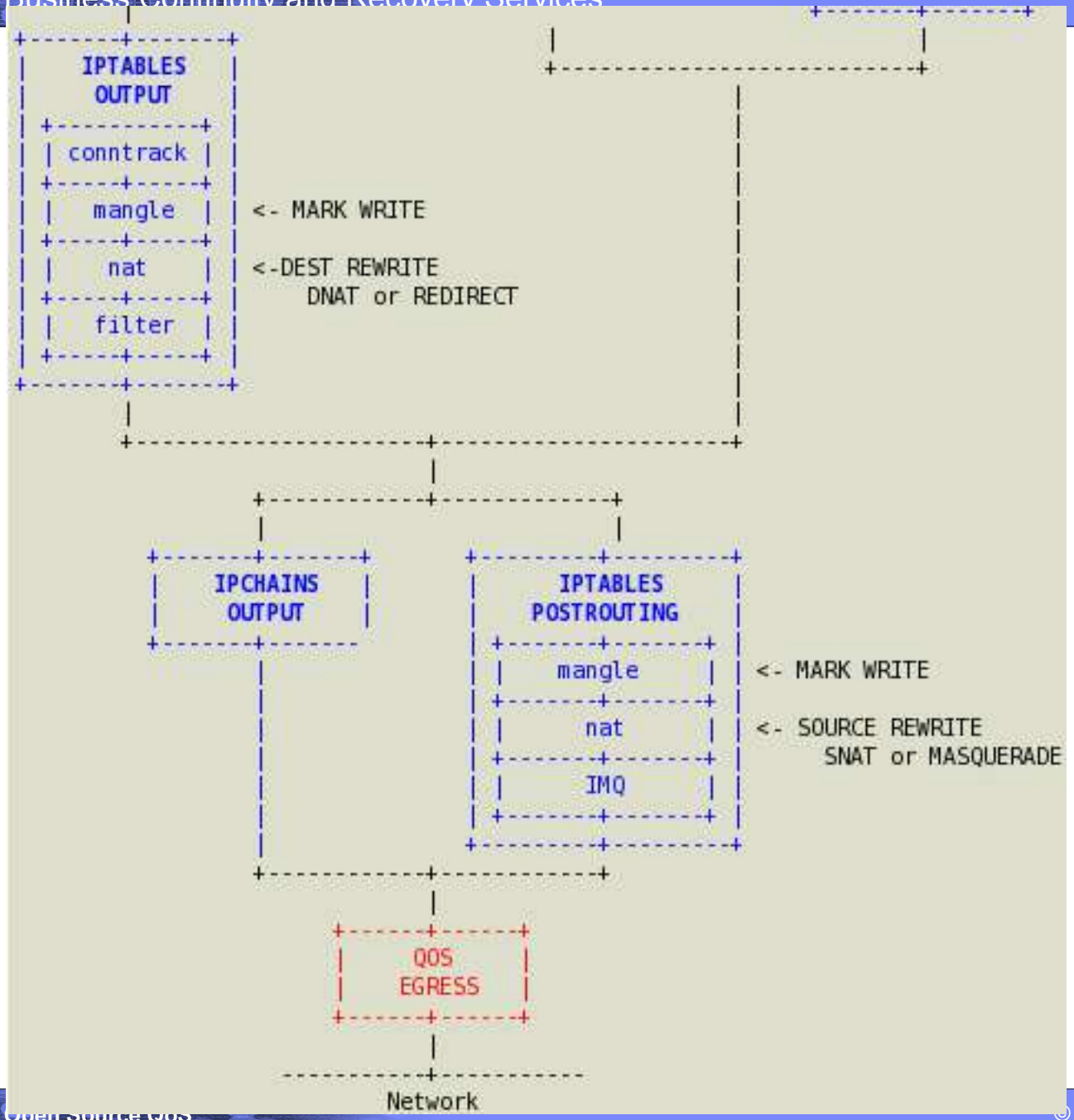
Kernel:

- QoS and/or fair queueing [x]

Userland:

- Mandrake/RedHat/SuSE
  - rpm -i iproute2.xxx.xxx.i586.rpm
- Debian
  - dpkg -i iproute
  - apt-get install iproute
- Gentoo
  - emerge iproute





Korištenje

```
iptables -t mangle -A OUTPUT -m length --length 0:500 -j MARK --set-mark 3
iptables -t mangle -A OUTPUT -m length --length 500:1500 -j MARK --set-mark 4

iptables -t mangle -A PREROUTING -m length --length 0:500 -j MARK --set-mark 3
iptables -t mangle -A PREROUTING -m length --length 500:1500 -j MARK --set-mark 4

tc qdisc add dev ppp0 root handle 10: cbq bandwidth 10Mbit avpkt 1000 mpu 64

tc class add dev ppp0 parent 10:0 classid 10:1 cbq bandwidth 10Mbit \
    rate 51Kbit allot 1514 prio 1 maxburst 10 avpkt 100 isolated
tc class add dev ppp0 parent 10:0 classid 10:2 cbq bandwidth 10Mbit \
    rate 461Kbit allot 1514 prio 8 maxburst 2 avpkt 1500 bounded

tc filter add dev ppp0 parent 10:0 protocol ip handle 3 fw flowid 10:1
tc filter add dev ppp0 parent 10:0 protocol ip handle 4 fw flowid 10:2
```

SQUID

- Najpoznatiji i najpopularniji proxy
- Izrazito konfigurabilan
- Moćan ACL
- Mogućnost integracije sa drugim autentifikacijskim tehnologijama
- Dolazi sa gotovo svakom poznatijom GNU/Linuxom distribucijom ili BSD-om
  - Fedora, Debian, Mandrake, SuSE, ...

SQUID delay pools

- SQUID mehanizam za QoS
- Klase (delay classes)
  1) Po sveukupnom prometu
  2) Po sveukupnom prometu i korisniku
  3) Po svekupnom prometu, podmrežama i korisniku

SQUID primjeri

```
acl divx_words url_regex -i divx
delay_pools 1
delay_class 1 1
delay_parameters 1 16000/16000
delay_access 1 allow divx_words

acl all src 0.0.0.0/0.0.0.0
delay_pool_count 1
delay_class 1 2
delay_parameters 1 12500/12500 2500/2500
delay_access 1 allow all
```

QoS: još par riječi...

- SQUID + Linux QoS (Squid+tc)
- Qlinux = QoS namjenjen multimediji
- Skripte namjenjene lakoj QoS konfiguraciji
  - http://www.freshmeat.net
- Dobar početak za QoS
  - http://www.docum.org
- Dobar početak za Squid
  - http://squid-docs.sourceforge.net/latest/html/

Kraj :-)

Hvala na pažnji!