

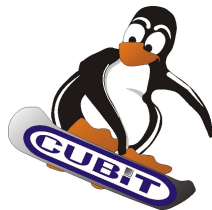
# LINUX ENTERPRISE CLASS

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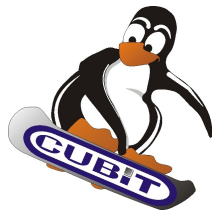
<http://www.cubit.at/pres/>



## Linux History

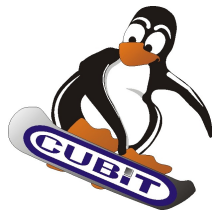
- **1995 University and Early Adopters**
- **1997 Development**
- **1999 Oracle, Early Business Use**
- **2000 Limited Business Use (IBM)**

open source for enterprise



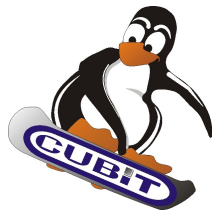
## Linux today

- 2002 Enterprise and Datacenter
- now Full Enterprise Support from ISV
- fastest growing Unix in the market
- broad hardware support



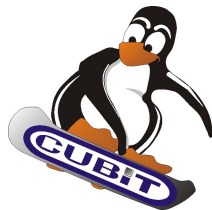
## Movement Unix->Linux

- **Linux unifies Unix Market**
  - **Tru64 fades away**
  - **AIX goes back (IBM focusses on Linux)**
  - **Sequent Dynix, SCO, DG, SGI IRIX**
- **but not unified:**  
**Redhat, SuSE, Mandriva?**



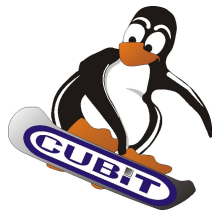
## People

- **Linux Users move from University to business**
- **take Linux with them**
- **Linux grows with the users!**



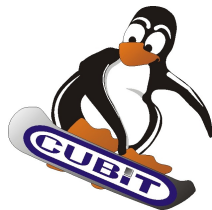
## People make Linux

- **New demands create new applications**
- **taking Linux from business to enterprise**
- **make Linux solve your problems**
- **adopt to people's new situation**



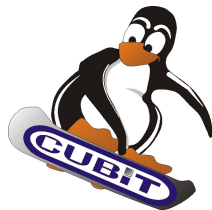
## Vendors

- Where to turn?
- Who does Linux?
- Who is in charge and has time?
- Distributor vs. Hardware Vendor
- who is cooperating with whom?



## Enterprise Environment

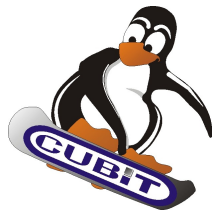
- high performance hardware
- SAN/NAS/ISCSI
- current hardware support
- slow version change (trainings,...)
- controlled changes
- cooperation with tools





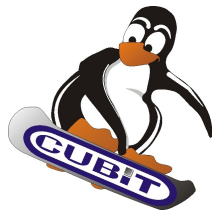
# Enterprise Requirements

- **stable versioning**
- **current hardware support**
- **slow version change (trainings,...)**
- **controlled changes**
- **cooperation with tools**



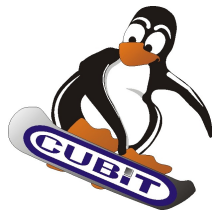
## Enterprise penetration

- first by devices (Cyclades, Brocade, Fortigate)
- specialized servers
- general purpose servers
- core applications
- and infrastructure



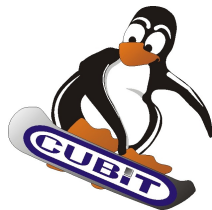
## Enterprise prerequisites

- professional codebase
- stable system
- support for high-load operation
- hardware vendor



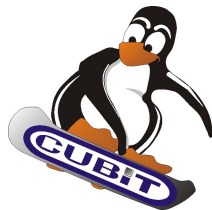
## Enterprise Server

- **x86 Server (x86\_64)**
- **large memory**
- **high load**
- **SAN or NAS attached**
- **multiple gigE interfaces**
- **Service processor**



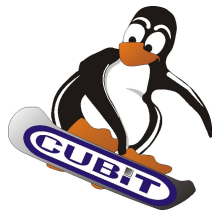
## Linux impact

- **Service Processor Support**
- **Console Support**
- **gigE TOE**
- **high performance switching**
- **SAN HBA**
- **monitoring**



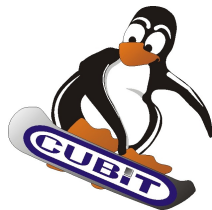
## Tuning – Kernel

- **IRQ and process affinity binding**
- **sysctl**
  - increase tcp\_[rw]mem
- **HZ values**
- **IRQ and DMA issues**
- **I2O, busmaster, PCI Architecture**



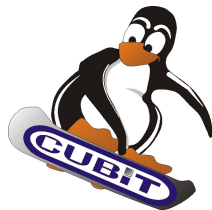
## Tuning – Kernel and Boot

- fast recovery (fsck, fast boot, serial console)
- reboot on panic
- watchdog
- high memory
- hardware support



## Tuning – Device Drivers

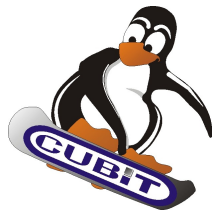
- **Hardware requires Driver**
- **Driver and OS versioning**
- **App and OS versioning**
- **each vendor requires own version**





## Device Drivers

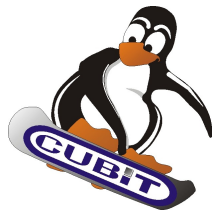
- **SuSE Enterprise Driver**
- **Redhat guarantee**
- **where to turn?**
- **performance vs. availability**
- **hardware vs. software**



## Large Linux

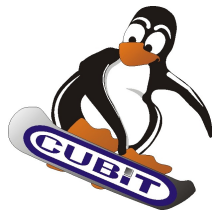
- image setup or boot from NAS/SAN
- nis/yp
- large Userbase (passwd w/ db)
- I/O
- LVM (with and without SAN)
- documentation and versioning (CVS)

open source for enterprise



## Communication

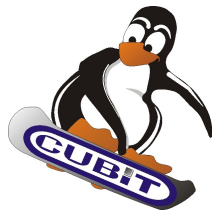
- low latency high thrupt
- infiniband, myrinet & co
- gigE
- multiple gigE
- use TOE!
- FC/AL



## Storage

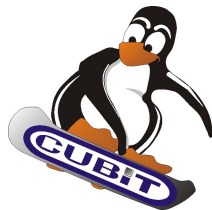
- FC makes more trouble
- use Ethernet as much as possible
- fast NFS is available. Use NetApp
- (NFS drivers are available and supported by NetApp)
- avoid closed non-open products
- multipathing :-)

open source for enterprise



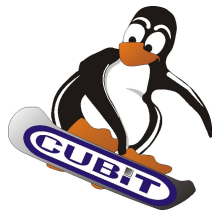
## High Availability

- **Multipathing**
  - dm is fun, especially with md
  - **SecurePath and PowerPath**
- **Ethernet**
  - bonding
  - **CISCO vs others**



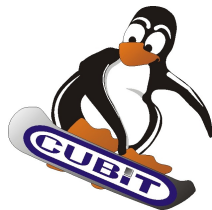
## Clustering and Virtualizing

- **heartbeat (HACMP look-a-like)**
  - **Storage Problems (HBA)**
  - **Stonith and Server service proc.**
- **load balancing**
  - **why?**
- **virtualizing (large linux)**



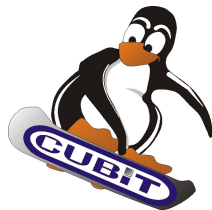
## Architecture

- **Storage centric**
  - storage should support Linux!
  - I/O must be fast enough
- **Availability (Clustering or fast recovery)**
- **cost-effective**
- **manageable**



## „Orgware“: Change Management

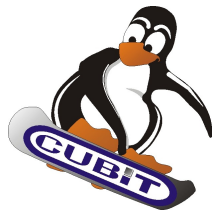
- managed changes
- supported by tools: cvs, scripts
- log every console input
- rollback root FS (NetApp SnapRestore(TM))
- always use test systems





## Field experience

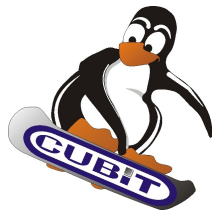
- **Change Management in Automotive**
- **Change Management in GxP (GAMP, GMP)**



## Environments in the Enterprise

- Environment at a PowerTrain Vendor
- Environment at a large SAP datacenter
- Environment at Drug Producer
- Environment at datacenters
- Environment in Aviation
- Environment at Carriers

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## More Info

- <http://www.cubit.at>
  - open source for enterprise
- <http://www.witta.at>
- <mailto:paul.witta@cubit.at>

# THANK YOU!

