

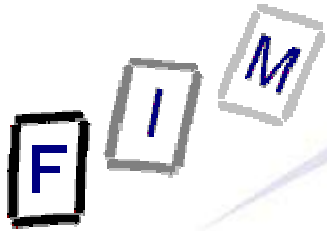
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# Selection

## Software, Providers

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# Questions?

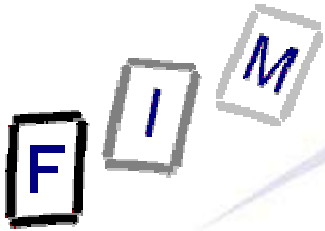
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**Please ask immediately!**

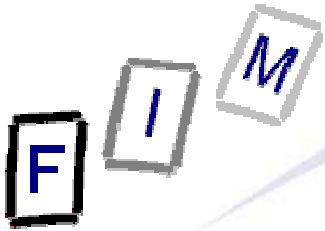
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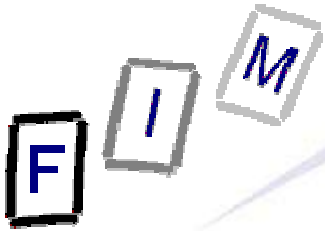
# Introduction

- Selection of operating system
  - Strategies
- Determining the kind of software to use
  - Total Cost of Ownership (TCO)
  - Strategies
- Selecting external providers
  - Access: ISP
  - Hosting: Webserver, mail, file, ...
  - DNS: Where to register
- Each with a small checklist of things to think of when selecting (even though for SMEs not all items will be important or even be answered by suitable providers)



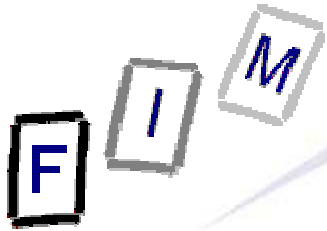
# Selecting OS

- Selection of software and especially OS should be as "undogmatic" as possible
  - "Microsoft bashing" might be fashionable at schools, but for businesses less ideologic reasons are much more important
  - "Linux enthusiasts" could find resistance with users
- We will look at three OS configurations in more detail
  - Windows: Employing Windows throughout the enterprise
  - Linux: On desktop, servers, infrastructure
    - » Could be any other FOSS (e.g. BSD); limited applicability also for other versions of Unix
  - Mixed environment: Using both for different sections
- Checklists for selection



# Selecting OS: Considerations

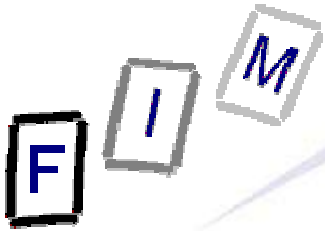
- Selection should be seen from the business focus
  - External requirements?
    - » Business partner systems, data conversion, legal framework, ...
  - Does it enable the business functions? How good?
    - » Required software available, interface to other systems, ...
  - What does it cost?
    - » Different kinds: Hardware, licenses, training, administration, ...
  - How flexible is it?
    - » More computers/applications, new requirements, upgrades, compatibility with new hardware, ...
  - What are the risks associated with it?
    - » Malware/security, uptime, support, vendors, misconfiguration, undesirable software (e.g. games), ...
  - Employees views/experiences?
    - » Administrator knowledge, user's education, ...



# Selecting OS: Windows Advantages

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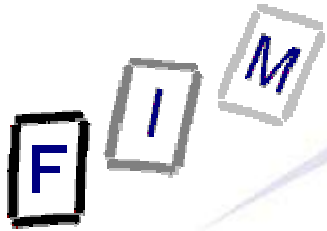
- Single vendor ensures "internal" compatibility
  - MS software will work nicely with MS software
- Almost everyone knows how to work with it
  - Many know how to administer it to some degree
- Often comes preinstalled on clients and therefore free
- Support and training easy to obtain
- Easy to administer for the common use cases
- Extremely wide software availability
- Drivers for new hardware available fast and completely
- Clearly defined licensing scheme
  - Easy to calculate and predict; support for verification
- Vendor support and updates guaranteed for some time
- Wide variety of national versions (language, icons, ...)



# Selecting OS: Linux Advantages

- Runs on older/slower hardware
- Driver support for older/"strange" hardware
- Open for modifications/changes on every level
- Basic versions are completely free
- Expert advice for free possible (!) on the web
- Interoperability of software generally better
- Source code available for review/inspection/modification
- Administration effort has slower increase
- Much software is also free
- Less security risks
- OS itself is more stable (programs not necessarily!)
- Different options: RedHat, Suse, BSD, Solaris, AIX, ...

→ "Transfer" of programs rather/more easily

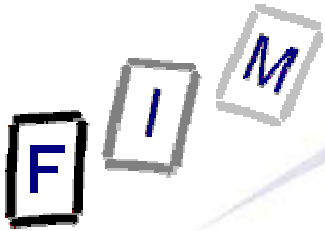


# Selecting OS: Mixed environment Advantages

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- Select the one best suited for the job
  - Based on users/applications/hardware/task/...
  - Some software runs only on specific OS or versions
- Improved overall security
  - Attacks must work on several OS combined or sequentially
- Reuse/obtain old hardware/software/OS
- Investments in knowledge remains valid
  - Both for users and administrators!
- "Never change a running system"
- Incremental change possible
- No lock-in to a single vendor/system
- Staff/users accustomed to change

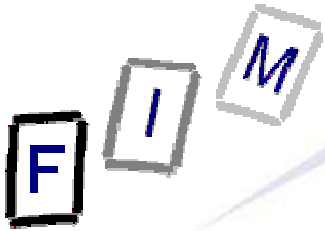




# Selecting OS: Mixed environment Problems

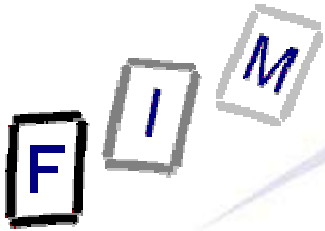
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- Administration more difficult
  - Some things might have to be duplicated
  - Something will always not work everywhere
- Requires more expertise in total
  - Experts on several OS required
  - Result often: Everything "working" but nothing "perfect"
- System interoperability more difficult to obtain
- Overview on licenses/versions difficult
- Detailed planning needed: Where can what be installed?
- General commercial support extremely difficult to obtain
  - Individual support: "Problem is in the other system"
- Lower performance because of friction
  - Conversions, standard protocols vs. private optimized ones, ...



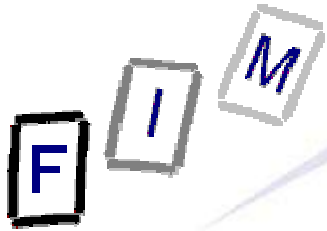
## Selecting OS: Checklist

- External requirements (specific software, partners)?
  - Requirements only for clients or also for servers?
- Local expertise available/how much actually needed?
  - External support needed?
- Complexity of tasks?
  - Training for non-Windows OS simple or difficult?
- Outsourcing of servers/security/... possible/desirable?
- Creating a new system/replacing old one/extending old one?
  - Replacing old: Compatibility issues; incremental change
- Heterogeneity and dynamics of change of requirements?
- What Hard- & Software is available?
- Customization needs ("standard" version sufficient)?



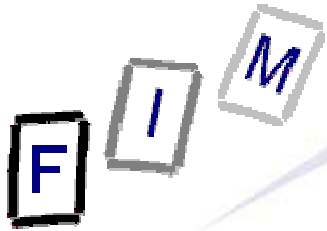
# Selecting Software

- Similar to OS, software is also an important factor
- Some standard software every company will need
  - Example: Web, E-Mail, Office
- For the actual business function (or supporting it), specific software will usually be required
  - Production: Planning/Control system
  - Services: Allocation of personnel/tasks
  - Generally: Personnel, accounting
- Three general options available:
  - (Real) Standard software: Buy and run
  - Standard (Customized) software: Buy and customize
    - » Customization may range from small modifications to large changes, consultants, long introduction
  - Custom software: (Let) Create for you specifically



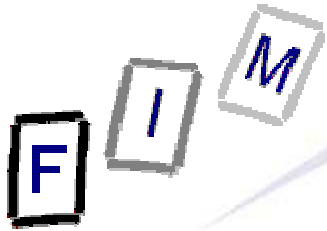
# Selecting Software: Basic strategies

- Use demo versions to assess suitability
  - As far as appropriate (e.g. personnel management software might take long time to install and test)
- Assess lifetime of supplier
  - Small/new companies might be cheaper, but continued support and development might be less ensured
- Assess size of supplier
  - Large companies will be more willing to provide guarantees
- Upgrade possibilities
  - Are there "larger" or "extended" versions available?
    - » Clear migration path for future extensions?
- Update cycles
  - How often can/must I update?
- Past handling of bugs?



# Selecting Software: TCO

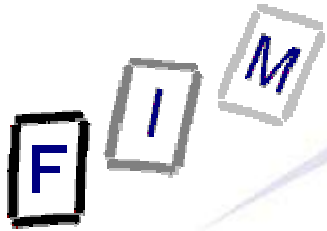
- Total Cost of Ownership (TCO): Complete costs/period
- Not only the cost of buying software is important, but also
  - Installing and administering it (incl. help desk)
  - Teaching users and admins (explicit and implicitly)
  - Updating and migrating from/to it (especially data conversion)
  - Additional/newer hardware required
  - Costs of downtime in case of problems
    - » Bugs, security problems, maintenance, ....
  - Users "exploiting" the system
    - » Opportunities create needs; "Futz factor" (games etc.)
  - Disaster prevention (redundancy, UPS, backups, ...)
  - Productivity of users
  - Energy, financing, consultants, disposal, air condition, ...
- These together are usually many times the license costs!



## TCO: 6 main factors

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- Purchase price
  - Direct and indirect costs
    - » Hardware, OS, software (per seat); printers, servers; financing ...
- Training costs
  - Formal and informal (=productivity loss) training
- Application costs
  - Changes in existing systems for creating compatibility
  - New systems required
- Maintenance and support costs
  - Admin personnel, support, management of IT department
  - Costs of problems (downtime, productivity, etc.)
- Environmental costs
  - Network (cables + equipment), Internet connectivity, power, cooling, etc.

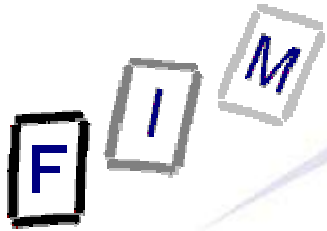


# Selecting Software: TCO

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- TCO assessment is a complicated process
  - Often with external consultants (obviously not for SMEs!)
  - Can also be simplified; even then very helpful!
- Should contain all direct and indirect costs
  - Indirect ones might be difficult: Use checklists if available
- Everything must be assessed in money
  - Cooperation of IT and management required
  - Might be difficult sometimes (e.g. cost of risk of downtime)
    - » What is the risk of downtime (once every year for 2 hours???)
- To be done **after** suitability and market research only!
  - Market research: What offers are available; what do they exactly consist of; are some preliminarily removed?
  - Suitability: Whether and how suitable is the solution?
    - » This must be compared with the resulting TCO at the end!



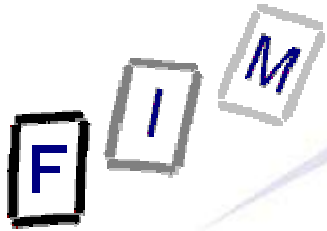


## TCO: Time factor

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- TCO changes over time
  - Hardware is deprecated, but may have longer/shorter lifetime
  - Training costs usually get lower over time
  - Repair costs increase
  - Productivity reduced compared to new products
- Minimum requirement: Calculating the TCO over the expected lifetime of the system!
  - Better: Regularly reassess (e.g. yearly)
    - » This might be a reduced form, e.g. only noting changes

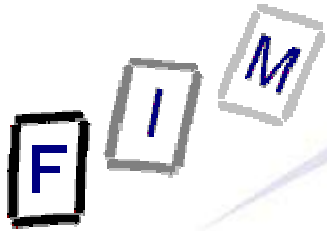




## TCO: Problems

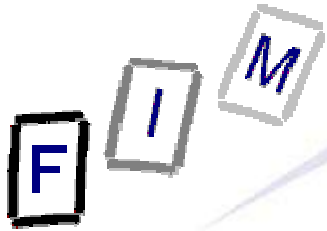
- TCO usually calculated per "client seat"
  - Therefore changes in their number can significantly change the TCO if there are large fixed costs (e.g. admin training, custom software, fixed server size); also not linear
- Must be calculated independently for several solutions, not from one solution and then compared to the others
  - See e.g. many commercial studies (Windows vs. Linux)
- TCO leaves out the actual gain
  - What does this solution add to the business processes?
- Some small issues can result in huge impacts
  - 95% availability vs. 99,9% availability, maximum wait time for support; usability/Happyness of employees/customers

**Cheapest is not always best!**



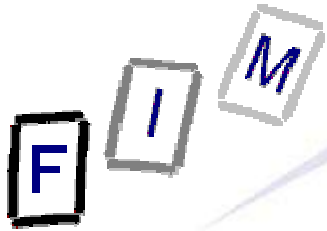
# Selecting Software: Custom

- "Purchase price" = cost of creation
  - High: Standard software is created once and sold often
- Training costs
  - Low-Medium: Involvement in creation, specially suited for task
- Application costs
  - Low: Modifications go in new and not old systems
- Maintenance and support costs
  - High: Bug fixes more likely, no spreading of cost across several customers, most internal software is rather admin-heavy (often "hack"), quality might be lower
- Environmental costs
  - Equal (more or less fixed costs for all types of solutions)



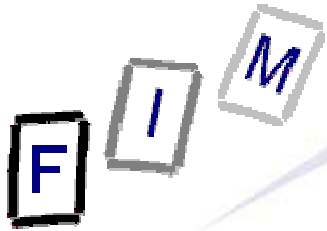
# Selecting Software: Custom

- With respect to TCO, custom software is therefore always a bad decision, usually even extremely bad
- But it has huge advantages:
  - Does exactly what is needed and probably absolutely right
  - Can be extended to new requirements rather easily
  - Tailored to all specifics of the company
- All this is not included in the TCO!
  - TCO is only a part; must be weighted against the advantages
    - » TCO is perfect for weighing to solutions with the exact same specifications (or at least requirements)
- As the main process (and its IT support) should define the company, there custom software is encountered often
  - Alternative: "One-of-many Inc." using standard solutions for its specific area, which are already tailored to such businesses



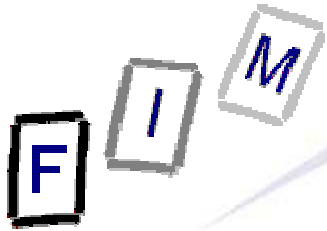
# Selecting Software: Standard

- "Purchase price"
  - Low-Medium: Created once and sold often, but might require more hardware, software, etc. (as it must fit and support all!)
- Training costs
  - Low: Often employees already know this software or training materials are readily available
- Application costs
  - Low-High: Depending how well this solution fits
- Maintenance and support costs
  - Low: Relatively bug-free, admin-interface usually well-defined, teaching readily available, "superfluous" features may come in handy (and for free!) later on
- Environmental costs
  - Equal (more or less fixed costs for all types of solutions)



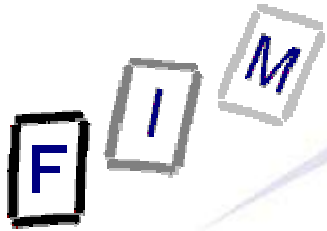
# Selecting Software: Standard

- With respect to TCO, standard software is therefore always a good decision
- Important advantages:
  - Quality assessment possible in advance
  - Fixed costs (development/modifications may "expand")
  - One responsible company only
- But it may have some disadvantages:
  - Friction: Interfacing with other software
  - Does what it is designed for, not necessarily what you need
  - Adaptations may have to be bought instead of developed
- Standard software therefore fits those business processes which are non-differentiating (lower performance not that important), but similar for many companies
  - Examples: Accounting, employee management



# Selecting Software: Customized

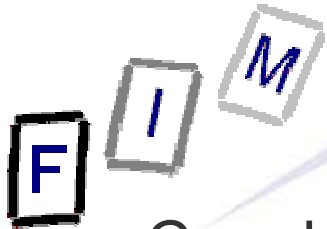
- Purchase price
  - Medium-High: Standard software + additional development
    - » Depends on the amount of customization required
- Training costs
  - Medium: Special training for modifications needed
    - » Rest similar to standard software
- Application costs
  - Low-Medium: Modifications mostly go in here
- Maintenance and support costs
  - Medium-High: Debugging difficult, administration two-fold, teaching material partly incorrect/incomplete
- Environmental costs
  - Equal (more or less fixed costs for all types of solutions)



# Selecting Software: Customized

- With respect to TCO, customized software is therefore a mixed bag; possible useful but not necessarily
- Important advantages:
  - Combines costs of standard SW with flexibility of custom SW
  - Costs can be assessed (fixed + variable component)
    - » Sometimes; Counterexample: SAP introduction
- But it may have some disadvantages:
  - Modifications may conflict with updates and future versions (re-customizing necessary)
  - Differences in UI/L&F/handling, quality, ...
  - Friction losses: Patches might not always work or not do exactly what is required, ....
- Fits business support processes, which are similar for many companies, but where local differences exist

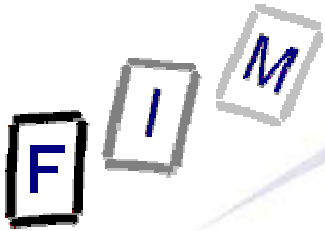




# Selecting Software: Conclusions

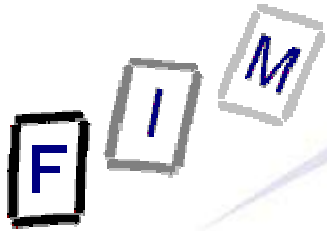
- Core business processes
  - Look for custom software
    - » This is what defines the company and makes it better than competitors, therefore must be supported extremely well
  - Alternatively look for "Branchenspezifische Software"
- Business support processes
  - Customized software (patches for individual peculiarities)
    - » Not important enough for custom software, but standard software cannot fulfill the requirements
  - When you want to use standard software, but cannot go without modifications
  - Or when custom software is desirable, but not affordable
- Administrative/other processes
  - Use standard software
    - » Much cheaper and slightly lower performance less important
  - Small modifications as necessary





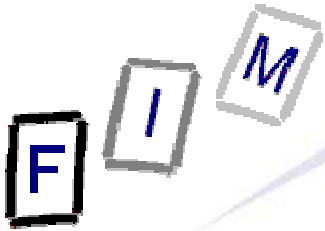
## Selecting providers

- Especially for small companies not everything can be provided for in-house
  - Example: Webserver (needs better Internet connection, complex configuration to be secure, DMZ, ...)
- Not all possibilities will be discussed here, only:
  - Internet connection (ISP)
  - Web hosting & E-Mail
  - Domain names
- Excluded are:
  - Managed security (firewall, IDS, patches, ...)
  - ASP (Application Service Providers)
  - Administration & Help desk
  - E-Commerce systems & payment gateways
  - ...

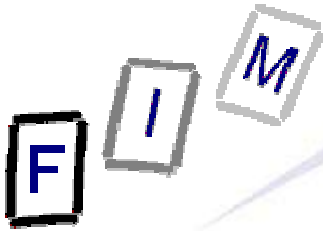


# Selecting providers: Outsourcing

- Outsourcing: Moving previously internal processes/services (non-core!) to specialized external service providers
  - Not directly applicable to small companies, but the principle remains valid!
- Principle: Do only what is specific to your company, i.e. the main business process and externalize support processes
- One essential requirement for successful outsourcing:
  - SLA (=Service Level Agreement)
    - » As this is a process tightly interwoven with the company, any problems with it will have large repercussions
    - » An exact definition what must be provided when in which quality (and what happens if not) is therefore a "must"
  - This is important also for other providers, although for SMEs this is reduced somewhat (not as strict)

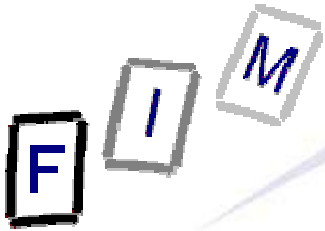


- Contains specifications on:
  - Service definition: What is to be provided?
  - Performance tracking: How will the performance be measured?
  - Problem management: What happens in case of problems?
    - » Important: E.g. obligations to help in moving to another provider!
  - Compensation: How the service fee is calculated
    - » Per seat, per minute, combinations, ...; exceeding use, ...
  - Customer duties: Separation of responsibility
  - Warranties and remedies: Liability for damages
  - Security: What security and safety measures are required?
    - » Partitioning to other customers, general measures, ...
  - Legal compliance, IPR, privacy
  - Termination: When and how to end the service
    - » And what happens afterwards (e.g. content&usage data)

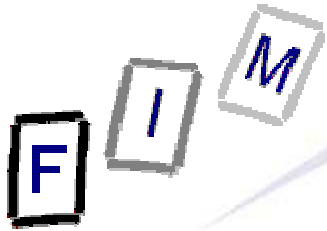


- Problems of SLAs:
  - SLAs are only sensible, when the provider can actually influence the service level
    - » This will be difficult if there are many providers with interdependent services!
  - The exact level might be difficult to find
    - » E.g. a small reduction in allowed outage time might have large increases in costs
    - » Do you actually know what you really need (not just want!)?
  - Evidence problems: "Something does not work"
    - » But who created the problem might be difficult to identify/prove
  - Often very complicated, long and legal
    - » Makes it very hard to enforce or even determine whether a breach occurred
- SMEs: Use short, precise and easily measured SLAs

# Selecting providers: ISP



- ISP here means "Internet connectivity" provider
- Selecting the ISP is crucial for all E-Business providers
  - You must be reachable at any time
  - E-Mails must be accepted every time
  - Your webpages must be accessible even under heavy load
    - » See next part if not hosting themselves!
  - Servers and special services (e.g. VPN) must be possible
    - » Even better: Available through the provider
- Important in this respect is your current situation (what services are provided in-house) as well as plans for future expansions
  - Changing an ISP might not be that easy as it looks!
    - » E.g. dedicated lines, termination equipment, outage time, static IP addresses, custom routes, reconfiguring equipment, etc.

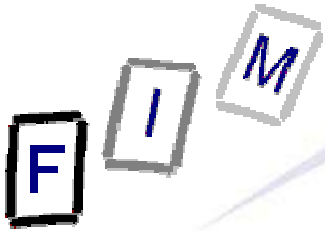


## Selecting providers: ISP Checklist

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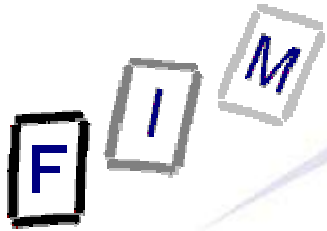
- What services are needed?
  - Pure connectivity or other services as well (DNS, hosting, VPN, content creation, mail server, mobile access, ...)
- What bandwidth is required now and perhaps later?
  - Is there an upgrade path available (e.g. cable TV???)?
  - Dialup or permanent connection?
- What about servers?
  - (Dis)Allowed, static IP addresses, ...
- SLA?
  - Guarantees for bandwidth (up to where), connectivity, ...
- Bandwidth? (A)Symmetric? Shared? Traffic?
  - Including: How is the ISP connected to the Internet?
    - » Bottleneck, speed, redundancy?

# Selecting providers: ISP Checklist



- Customer support/hotline?
  - When, how often, charges, response time, ...
- Any additional requirements?
  - Existing telephone line, ISDN, restricted service area, ...
- Security services available/imposed?
  - Closed ports, mail filtered; optional or mandatory?
- Reputation of ISP?
  - Being on AOL might be a disadvantage...
- Contractual restrictions?
  - Termination times, payment methods, ...
- What equipment is provided?
  - Where is the exact boundary and which interface is there?
- Pricing?



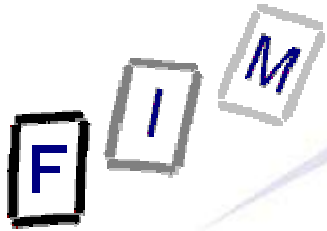


## Selecting providers: Hosting

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- Hosting for a business website is more complicated than with private/personal webpages
  - Server reliability directly translates to money
  - Security much more important (availability, defacing, ...)
  - Payment gateways are too expensive/complicated for small companies; support needed
- Compared to an ISP, hosting is much more complicated
  - » Unless you have static webpages only...
  - DNS is tied in tightly (nameservers and targets)
  - Different server environment needed
    - » Database, programming language, server extensions
  - Secure server (cryptography; e.g. SSL) requires hardware support or powerful servers
  - Much more differentiation of service possible and available!

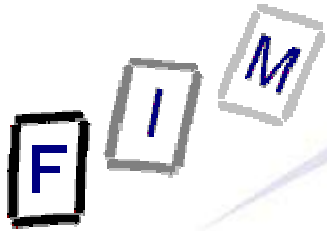




## Selecting providers: Hosting Checklist

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- How reliable is it?
  - Average uptime (independent verification possible, backup systems, Internet connectivity, redundancy, ...)
- Which security measures are in place?
  - Physical security, fire suppression, network security, IDS, partitioning, firewall, applying patches, ...?
- Management of the server arranged how?
  - Shared (=virtual server), Collocated (=own hardware in ISP data center, using UPS, Internet, etc.), unmanaged dedicated hosting (=server is leased; similar to collocated), managed dedicated hosting (=outsourcing; only content provided)
  - Customer access when/how; content updates, ...
- Server characteristics?
  - Amount of space/traffic, server extensions, database, software installation possible (free/from list), SSL, ...

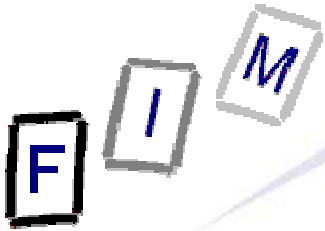


## Selecting providers: Hosting Checklist

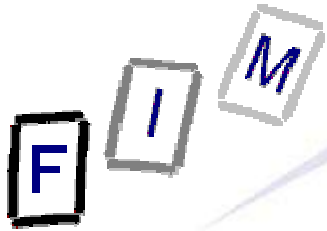
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- Usage statistics available?
  - Details, analysis (e.g. geographical), periods, raw logs, ...
- Any free add-ons?
  - E-Mail, FTP, automatic monitoring, content verifications, ...
- Surrounding issues?
  - Porn, spam, game servers around (blacklisting!)?
- How good is customer support?
  - Response time, technician/"sales", sysadmin available, ...
- Can specialties be provided?
  - Multicasts, streaming video, webradio, ...
- What kind of monitoring is done?
  - Technician on site 24/7, remote, per server/general, ...
- Pricing?

# Selecting providers: DNS



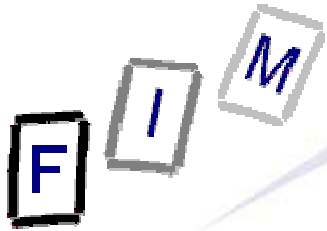
- Previously domain names were available only by a single provider each; still the case for most CC domain names
  - Especially ".com" is available by many providers
  - Similarly, many providers "sublicense" names through acquiring "bulk registrations" by the (monopoly) registrar
- Separating DNS from hosting?
  - Makes administration more difficult, but allows changing either of them much easier!
- Especially for SMEs this is a relatively easy decision: Go for the cheapest possible one!
  - But take care of the nameserver: Provided by DNS provider or by your web hoster (or yourself)?



## Selecting providers: DNS Checklist

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- What about the nameservers?
  - Provided (cheap registration often excludes them!), how many, quality, ...
- Who is named in the person records (owner, admin-c, ...)?
  - Provider, hoster, you, ...
- How can changes be made?
  - Additional subdomains, mail server entries, Sender-ID(?), domain transfer, domain name blocking, ...
- How are time-issues handled?
  - Automatic renewal, notification mail, etc.
- Any free add-ons available?
  - DNS forwarding, E-Mails, name protection/monitoring, search engine registration, ...



## Selecting providers: DNS Checklist

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- What technical infrastructure is available?
  - Own/foreign DNS servers, redundancy, Internet connection, ...
- Whois service content?
  - What will be disclosed, where stored, availability, privacy protection schemes, ...
- What customer support?
  - Reachability, topics, ...
- What about domain name disputes?
  - UDRP, custom arbitration, enforcing court orders, ...
- Price and payment?
  - Methods of payment, currency, location of provider, ...