



PIC

軟體架構師 補充教材

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日 期： 2017/10/18



1. Design Usability
2. Information Architecture
3. Design for Performance
4. Reliability & Availability
5. Globalization & Localization
6. Design for Security
7. Application Integration and Business Process Integration

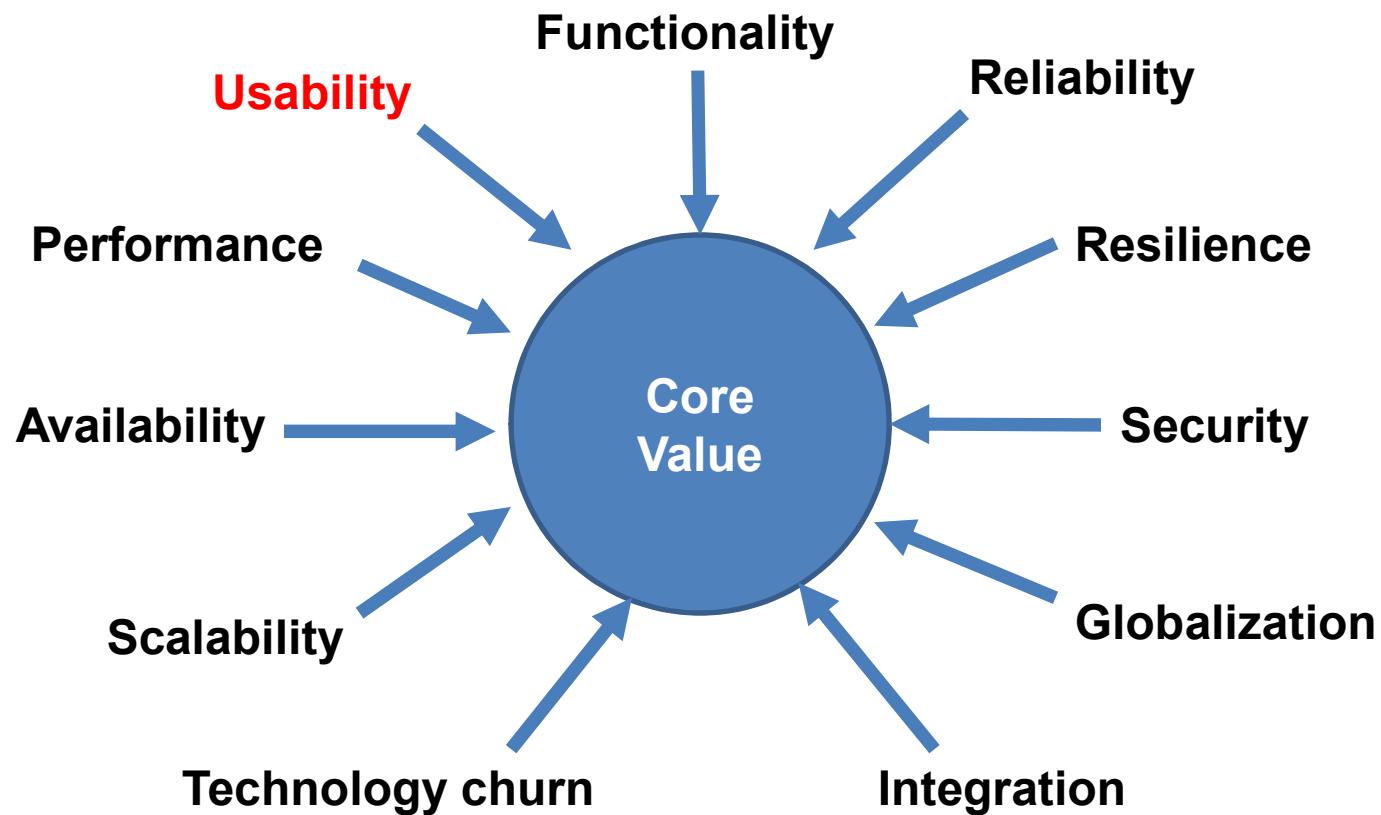
1. DESIGN USABILITY(易用性)



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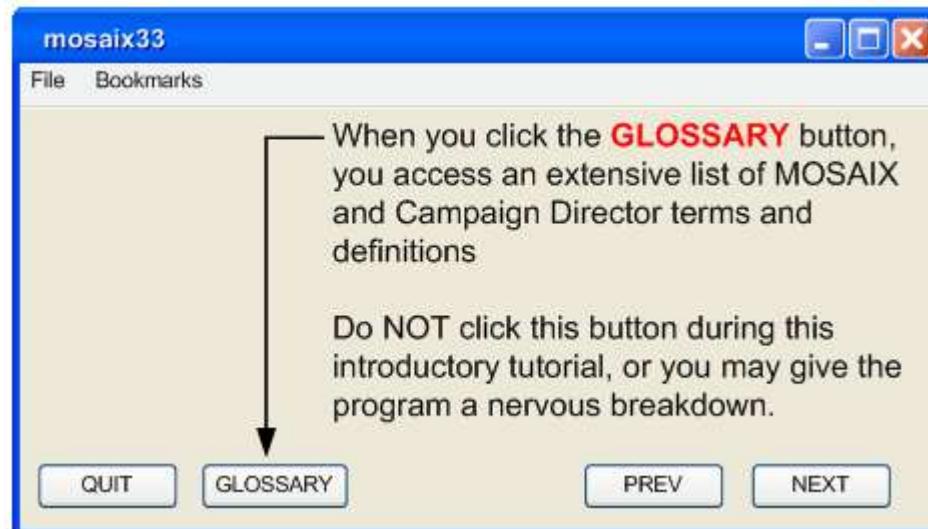
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- Design Process
- Design Guidelines



Unfriendly User Interface

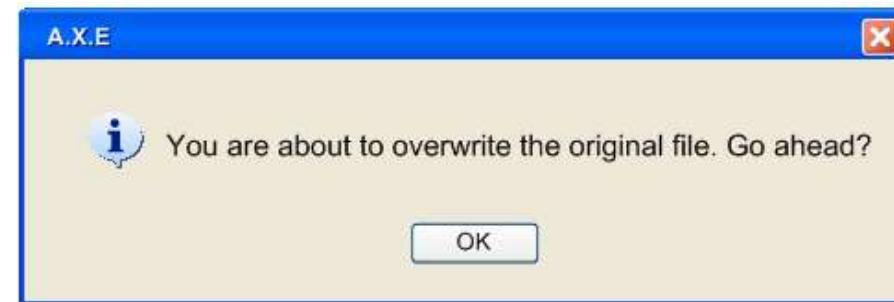
PROFESSIONAL INNOVATION COLLABORATION



Why show the button if I should not click it?



Umm, thanks for the warning, but what should I do?



Do I have any choice in this?

5 characteristics

1. Understandability
2. Learnability
3. Operability
4. Attractiveness
5. Compliance to application-related standards, conventions, regulations, and protocols

Interaction Design

- task, domain analyses (scenarios)
- user requirements specification
- storyboards, UI specification

Usability Test

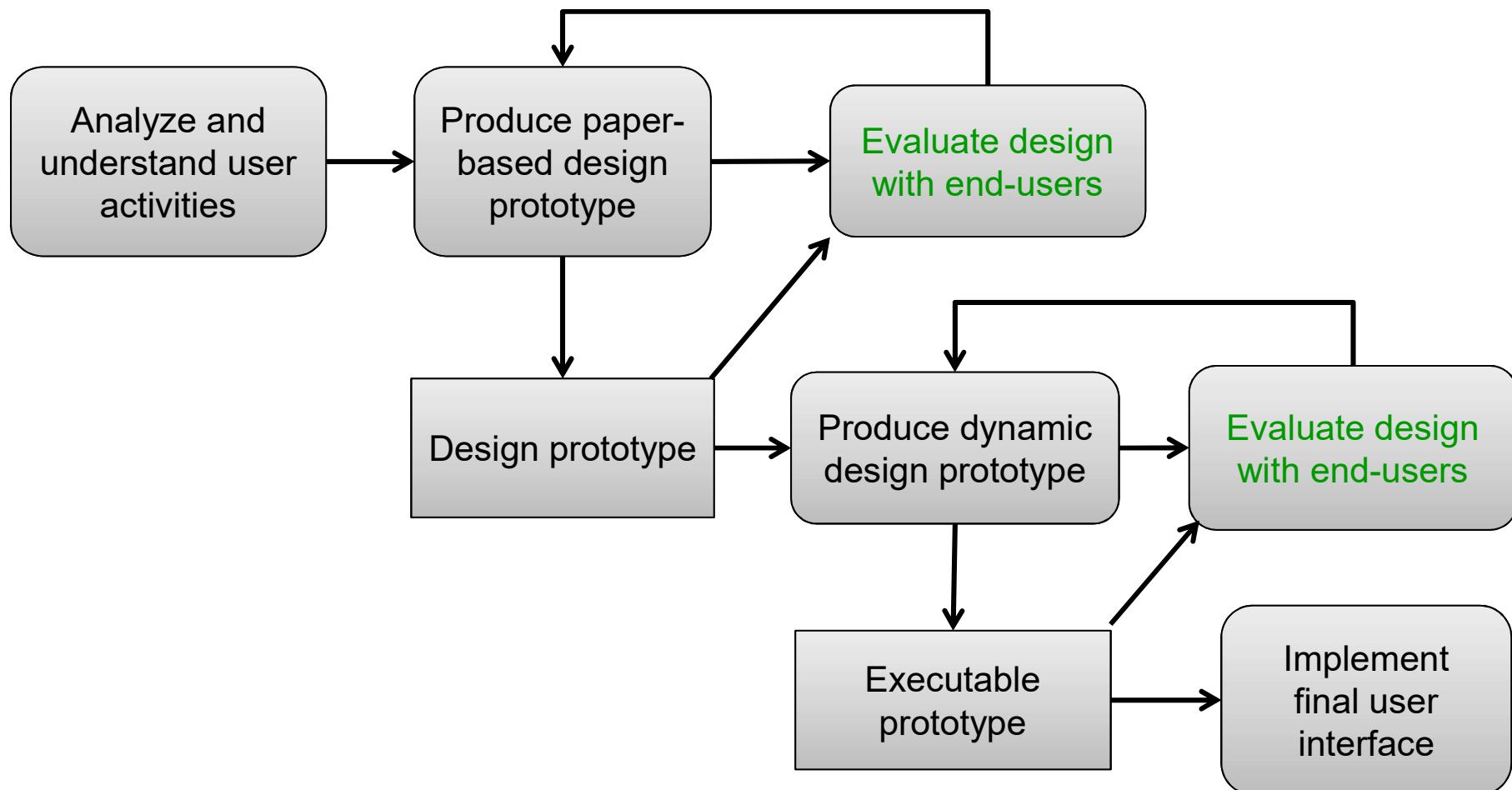
- expert review
- user walkthrough
- user test



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- Systematic, but agile!



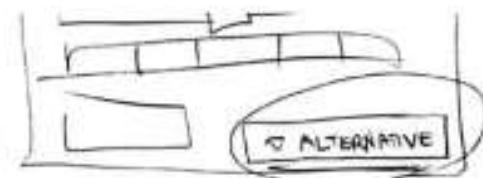
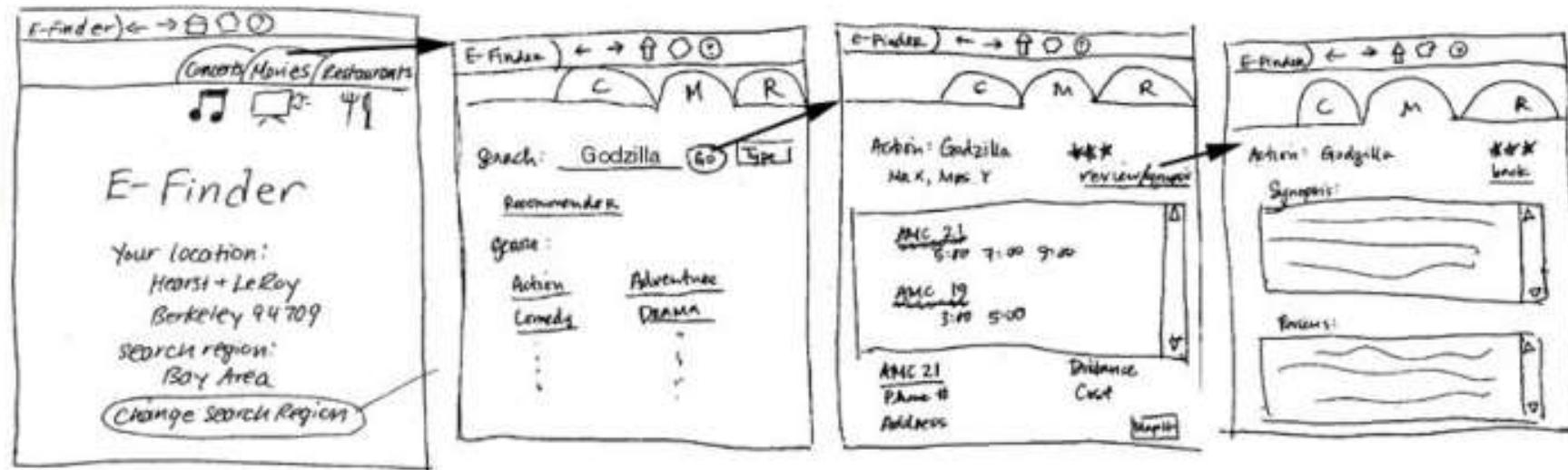
1. Do your task analysis
2. Identify the important tasks and their steps
 - Use **personas** to identify the important ones
 - Use **card sorting** to help organize the tasks
 - Use **scenarios** to give order to the task sequences
3. Organize these into several different designs
 - Get the main interactions sketched out
4. Use design guidelines to help make decisions
5. Create low-fi prototypes to quickly assess the different designs

Low-Fi Prototype

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SCENARIO 1

"I want to listen to alternative music"



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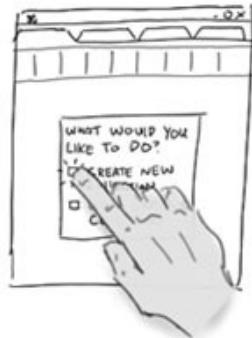
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- Sketching is important to low-fidelity prototyping
- Don't be inhibited about drawing ability. Practice simple symbols.

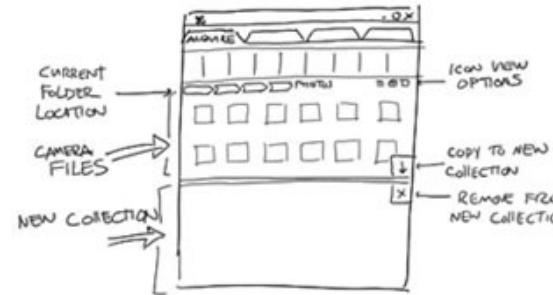
- Often use with scenarios, bring more detail, and a chance to role play
- It is a series of sketches showing how a user might progress through a task using the device
- Used early in design

Storyboard sample

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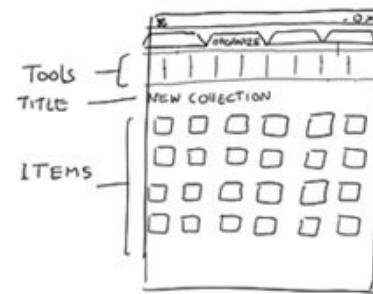
CREATE NEW
COLLECTION



1 - DOWNLOAD FROM CAMERA
(OR)
- RETRIEVE PHOTOS FROM
DEFAULT CAMERA LOCATION



SELECT DATA FILES



? SCROLL OR SCALE
to Fit All Item

“ORGANIZE” HOME
SCREEN



SELECT FACE TO
SORT BY



EDIT LAYOUT OF
COLLECTION



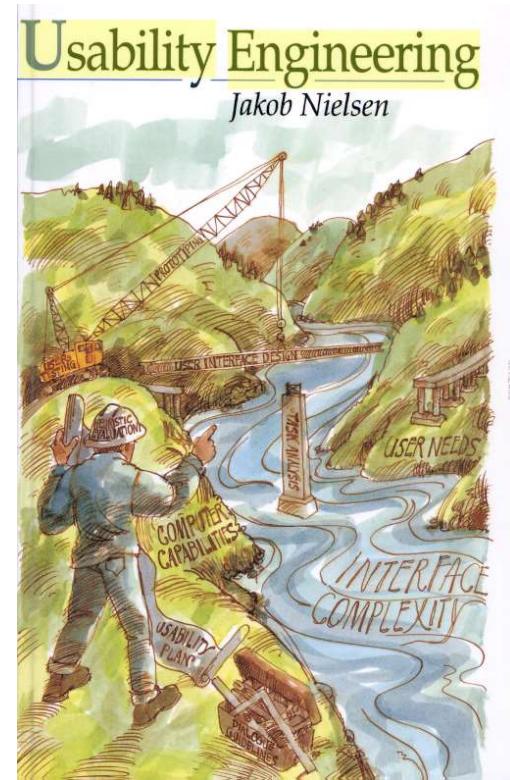
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<https://msdn.microsoft.com/en-us/library/windows/desktop/ff800706.aspx>

- There are *LOTS* of them
 - Based on common sense and experience
 - Often conflict with one another
- What to do:
 - Focus on those guidelines most applicable to the kind of interface under development
 - Reference top-ranked software products/web site
 - Use common sense

1. Speak the users' language
2. Simple and natural dialogue
3. Minimize user's memory load
4. Be consistent
5. Provide feedback
6. Provide clearly marked exists
7. Provide shortcuts
8. Deal with errors in positive and helpful manner
9. Provide help



書名	Usability Engineering, 1st Edition
作者	Jakob Nielsen
出版日期	1994-09-23
ISBN	9780125184069



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The dialogue should be expressed clearly in words, phrases, and concepts familiar to the user, rather than in system-oriented terms

- Good icon design is difficult
- Meaning of icons is cultural and context sensitive

- Dialogues should not contain information that is irrelevant or rarely needed
- All information would appear in a natural and logical order
- Integrate style and function comprehensively and purposefully

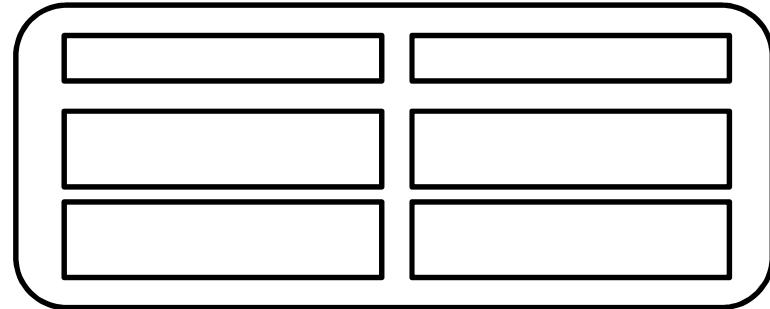
- Balance
- Symmetry
- Regularity
- Predictability
- Sequentiality
- Economy
- Unity
- Proportion
- Simplicity
- Groupings



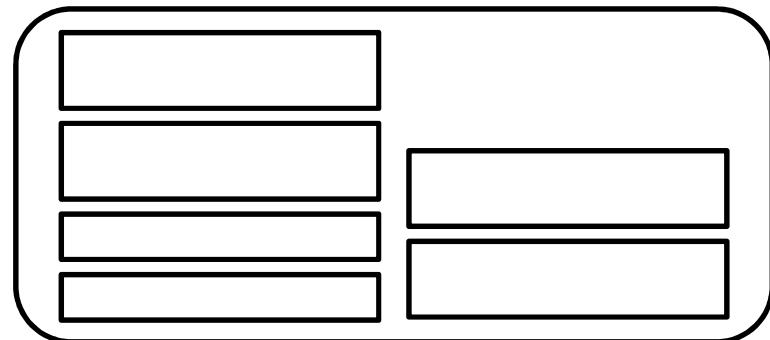
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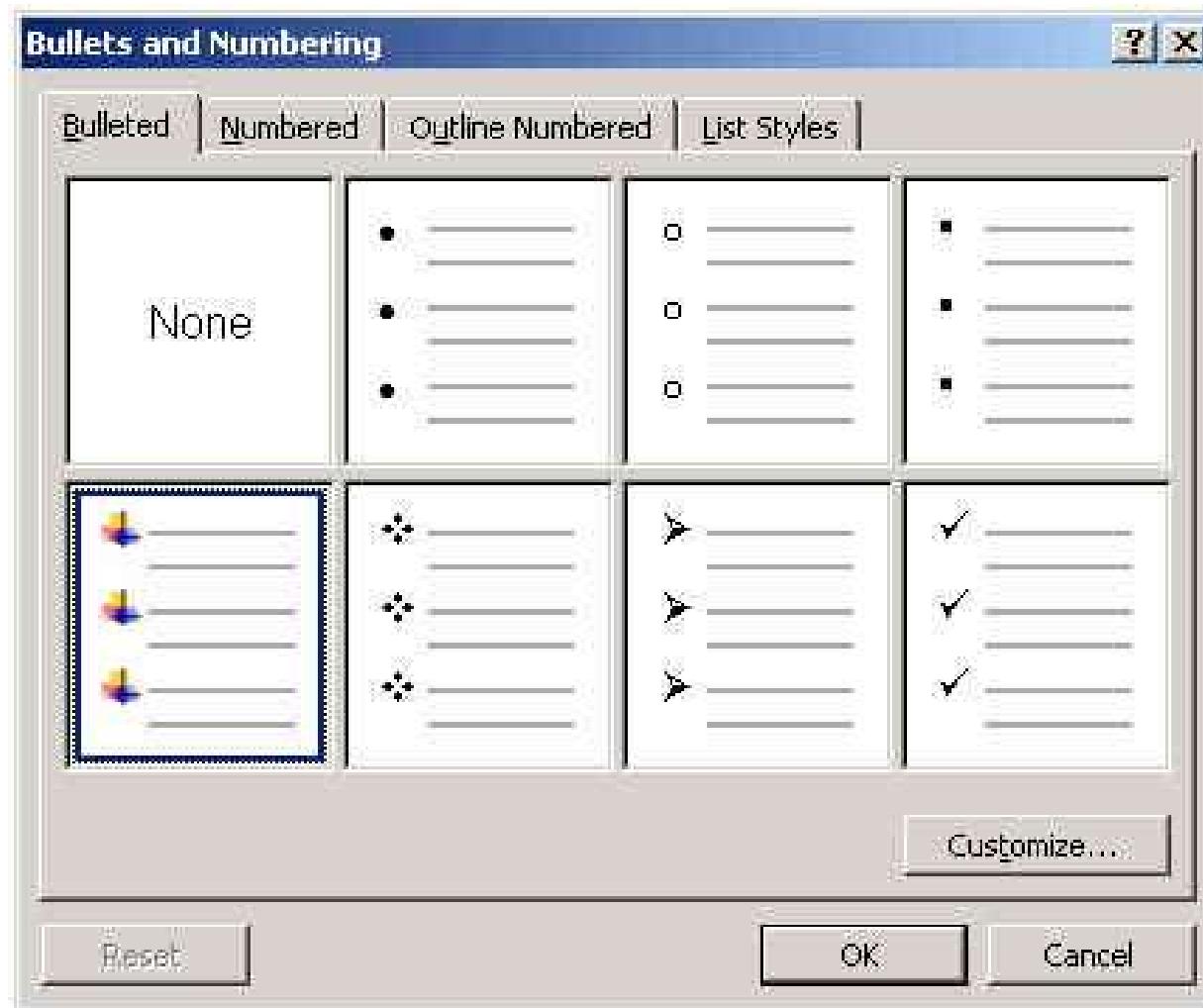
- Left column processed
 - Right column noted as same



- Both columns need to be understood by visual processing system



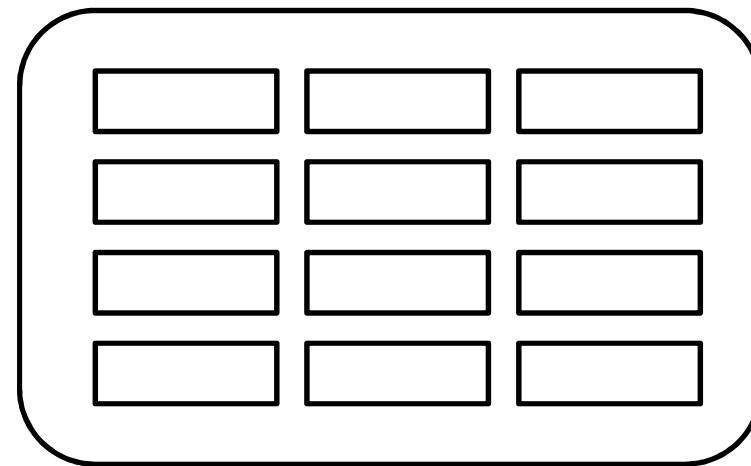
- Replicate elements left and right of the center line



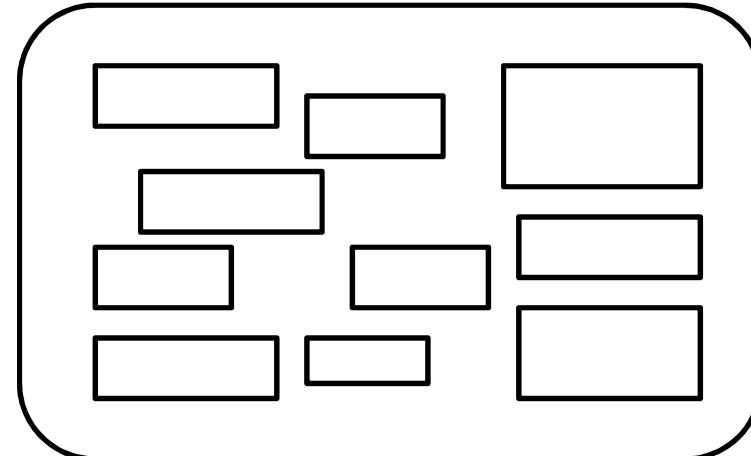
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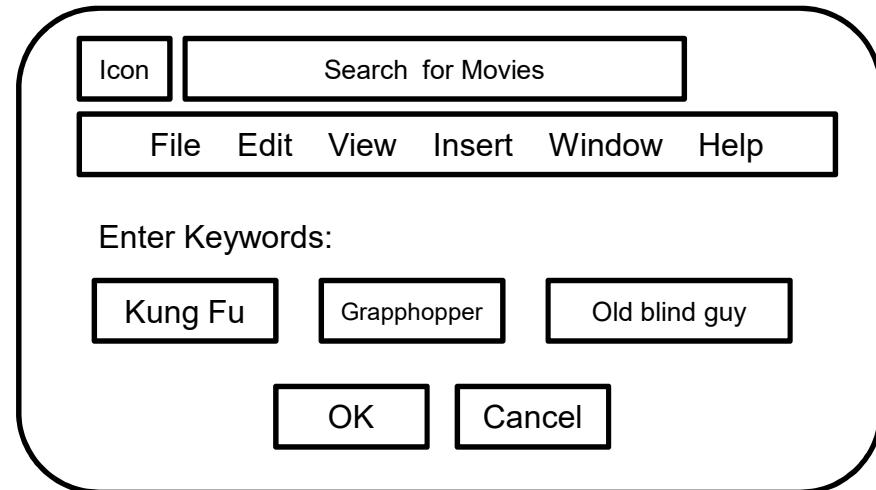
- Left column processed – 2 right columns noted as same



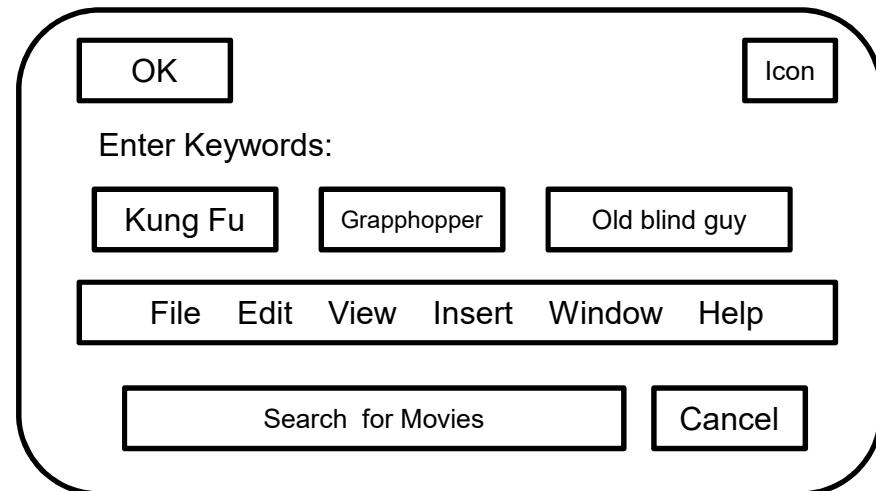
- Location & size of each object processed



- User expects title & menu bar on top of screen



- Visual scene needs to be completely processed-objects not in expected places



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- Guide the eye through the task in an obvious way, The Eye is attracted to:
 - Bright elements over less bright
 - Isolated elements over grouped
 - Graphics before text
 - Color before monochrome
 - Saturated vs. less saturated colors
 - Big vs. small elements
 - Unusual shapes over usual ones

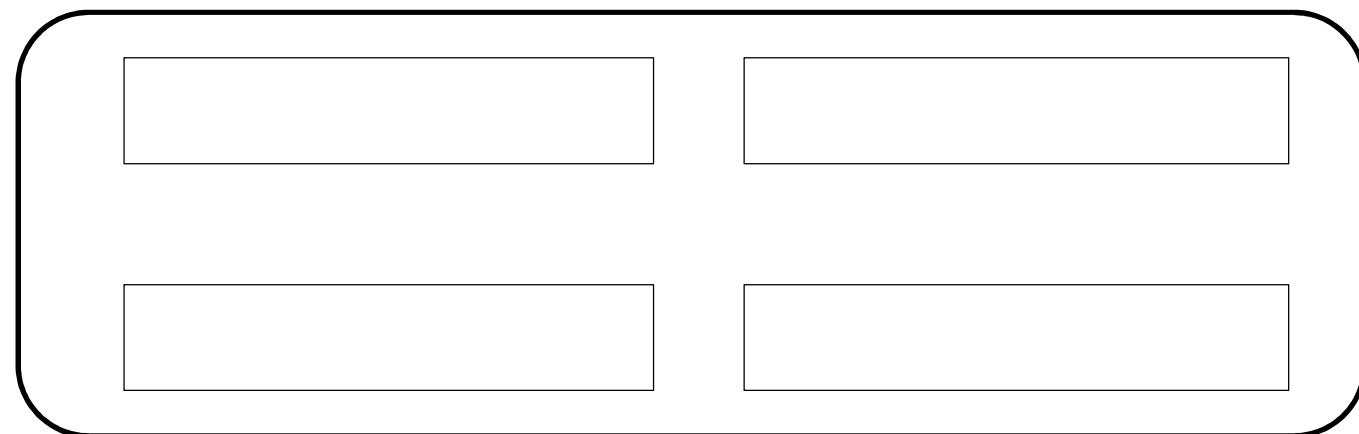
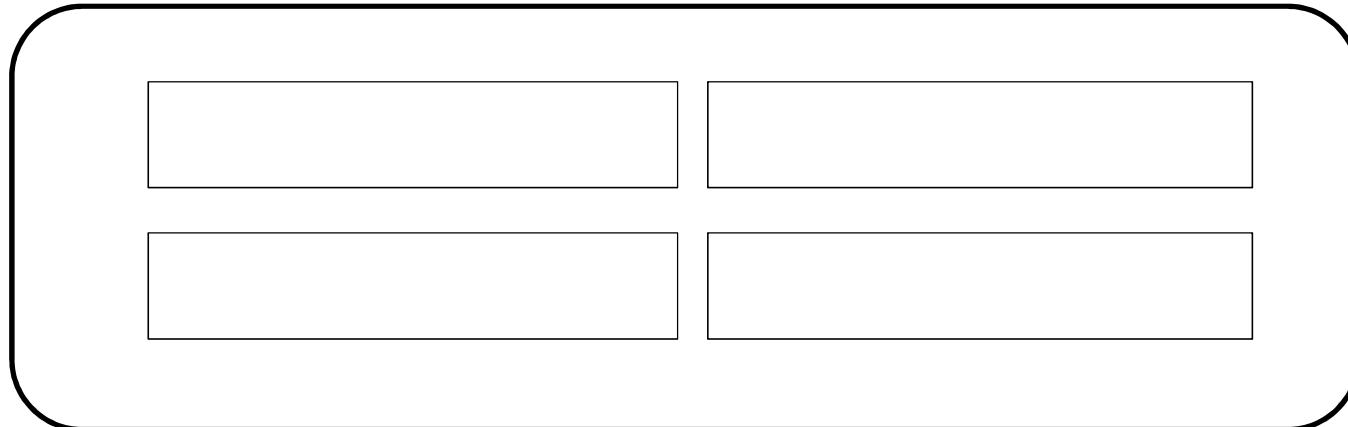
- Use as few styles, fonts, colors, display techniques, dialog styles, etc., as possible



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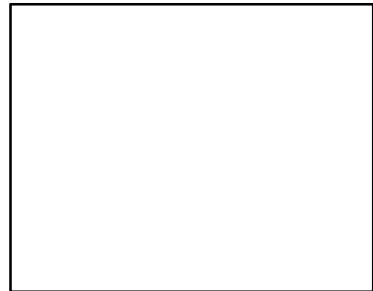
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- Make items appear as a unified whole (for visual coherence)

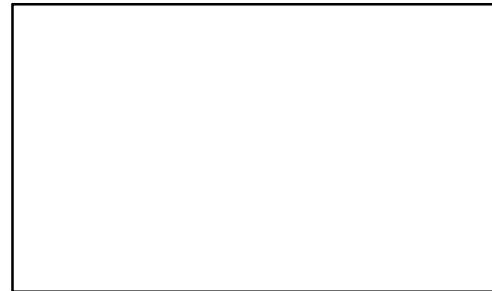


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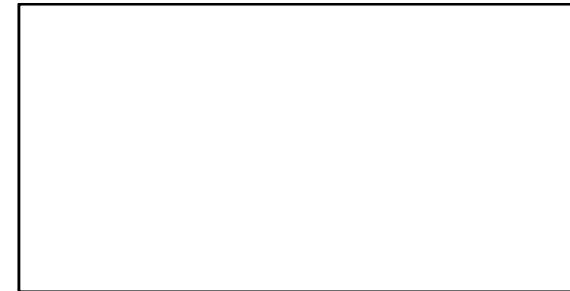
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Square – 1:1



Square Root of 2 –
1:1.414



Golden Triangle –
1:1.618



Square Root of 3 – 1:1.732



Double Square – 1:2



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- Minimize the number of aligned points

- Only four alignments need to be processed

Membership Form

Name:	<input type="text"/>	Dues:	<input type="text"/>
Address:	<input type="text"/>	Pubs:	<input type="text"/>
City:	<input type="text"/>	Total:	<input type="text"/>
State:	<input type="text"/>	OK Cancel	
Zip:	<input type="text"/>		

- A total of nine alignments need to be processed

Membership Form

Name:	<input type="text"/>	Dues:	<input type="text"/>
Address:	<input type="text"/>	Pubs:	<input type="text"/>
City:	<input type="text"/>	Total:	<input type="text"/>
State:	<input type="text"/>	OK	
Zip:	<input type="text"/>	Cancel	



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- Similar elements aligned vertically
- Vertical distance between similar objects small
- If we can group using alignment & space, then save the complexity of boxing or coloring

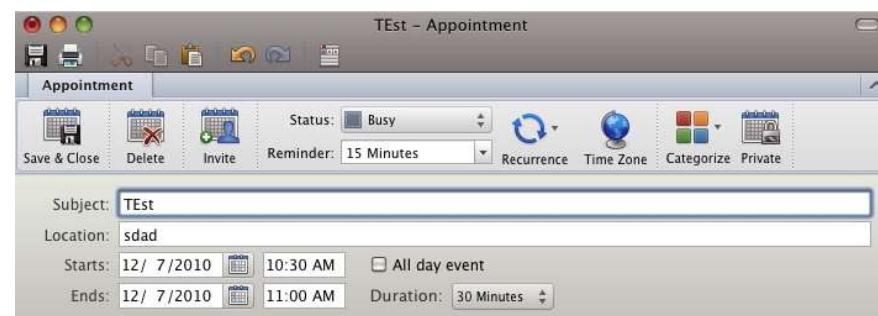
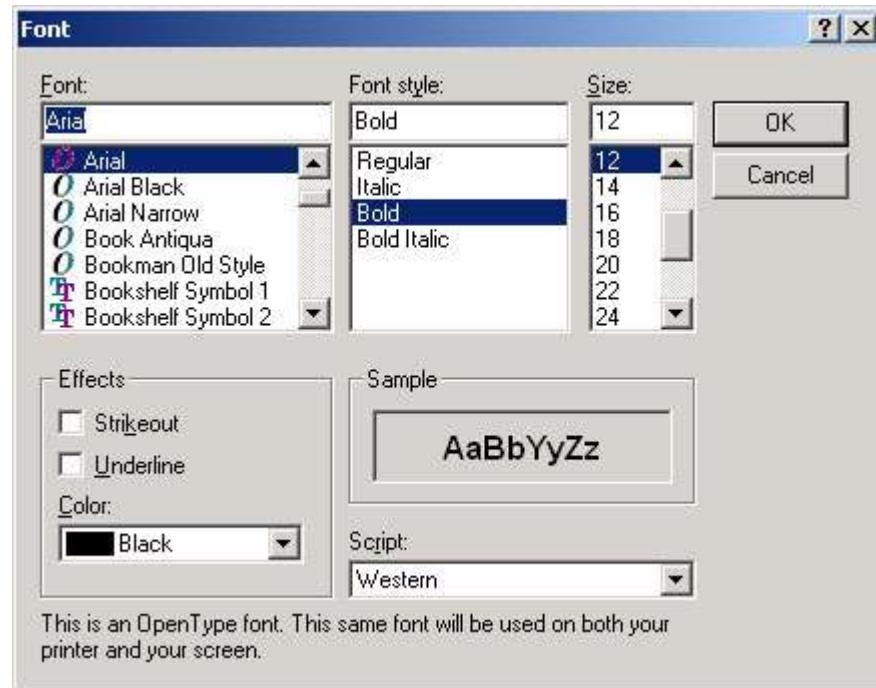
Membership Form

Name:	<input type="text"/>	Dues:	<input type="text"/>
Address:	<input type="text"/>	Pubs:	<input type="text"/>
City:	<input type="text"/>	Total:	<input type="text"/>
State:	<input type="text"/>	<input type="button" value="OK"/> <input type="button" value="Cancel"/>	
Zip:	<input type="text"/>		



#3 Minimize User's memory load

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- If not specified before implementation, ask UI design professionals to review UI.

The image shows a user interface for a 'Subscriber' record. At the top left is a large, rounded rectangular button containing a black question mark. An arrow points from this button to a smaller rectangular button labeled 'Subscriber'. Below these are two rows of input fields. The first row contains 'Name:' with an input field, 'Tech. Representative:' with an input field, 'Account #' with an input field, and 'Status:' with an input field. The second row contains 'Contact' with a dropdown arrow, 'Telephone:' with an input field, 'E-Mail:' with an input field, 'Address:' with an input field, and 'State:' with an input field. At the bottom are two buttons: 'Save' on the left and 'Cancel' on the right. The entire form is set against a light gray background with a faint, jagged watermark of a person's profile on the right side.

#5 Provide Feedback

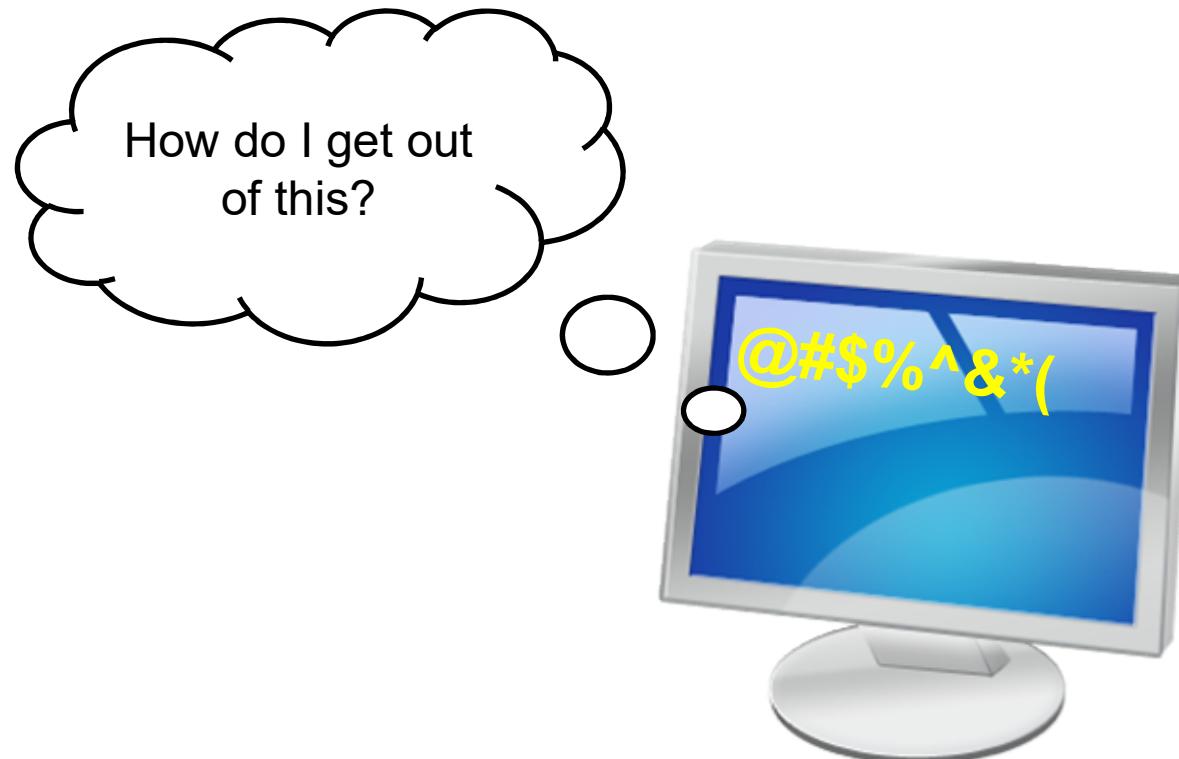
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- Quit (for leaving the program at any time)



Experienced users should be able to perform frequently used operations quickly



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#8 Deal with Errors in a Positive and Helpful Manner

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People will make errors!



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- Help is not replacement for bad design!
- Simple systems:
 - walk up and use; minimal instructions
- Most other systems:
 - feature rich
 - some users will want to become “experts” rather than “casual” users
 - Intermediate users need reminding, plus a learning path
- Be consistent with the right version



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Detailed usability requirements sample

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- Understandability
 - Interface elements (e.g. menus) should be easy to understand
 - For a walk up and purchase or use system, the purpose of the system should be easily understandable
- Learnability
 - The user documentation and help should be complete
 - The help should be context sensitive and explain how to achieve common tasks
 - The system should be easy to learn
- Operability
 - The interface actions and elements should be consistent
 - Error messages should explain how to recover from the error
 - Undo should be available for most actions
 - Actions which cannot be undone should ask for confirmation
 - The system be customizable to meet specific user needs
 - A style guide should be used
- Attractiveness
 - The screen layout and color should be appealing



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- Usability attributes

Attribute	Description
Learnability	How long does it take a new user to become productive with the system?
Speed of operation	How well does the system response match the user's work practice?
Robustness	How tolerant is the system of user error?
Recoverability	How good is the system at recovering from user errors?

- Your design should be
 - User-centered
 - Logical and consistent
 - Compiled with existing conventions when applicable
 - Keep an eye on trend or fashion
 - Beware of creativity

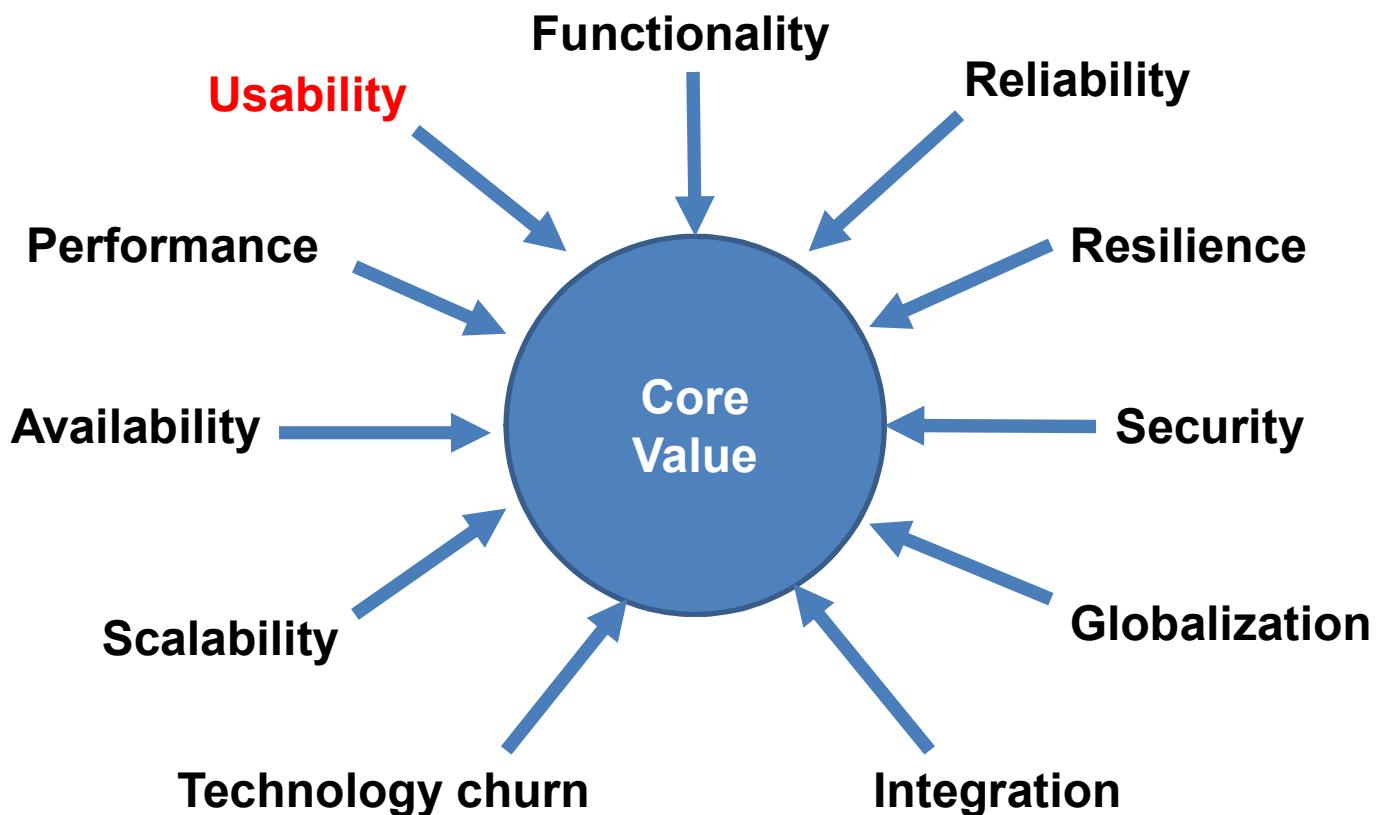
2. INFORMATION ARCHITECTURE



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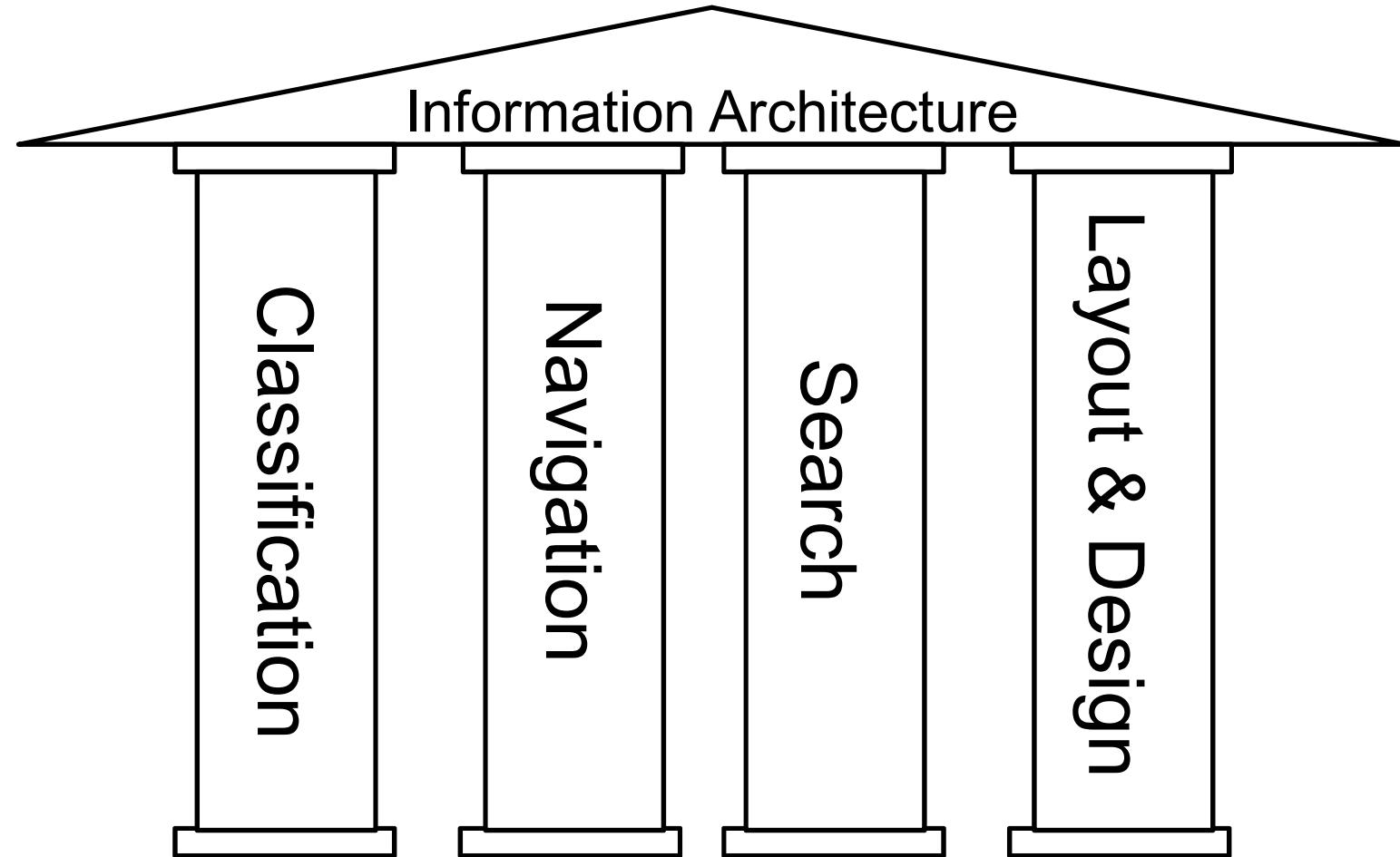
- Classification Design
- Navigation Design
- Search Design
- Layout and Design



- Web is the main source of information
- In a website, the style is in the content, not in the graphics
- It is ‘information architectural’ design

- Definition
 - Information architecture deals with the organization and layout of content on a website

- To help people find the content they need as **quickly** as possible
- To put content in **context** so that it becomes part of a cohesive body of knowledge
- To present content in its most **readable** format



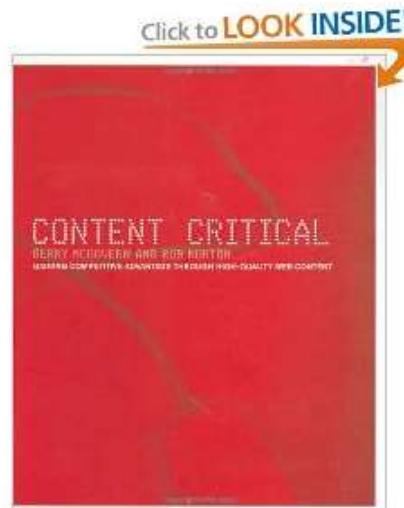
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- Classification Design
- Navigation Design
- Search Design
- Layout and Design

Classification Definition

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Click to LOOK INSIDE!

Content Critical: Gaining Competitive Advantage Through High-Quality Web Content

[Paperback]

Gerry McGovern (Author), Rob Norton (Author)

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- Classification is about organizing content into logical groups or sets

- Consistent, quality experience for reader
- Faster, more cost-effective to develop
- Easier, more cost-effective to manage



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以旅遊網站為例

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入住城市 上海

入住日期 2012-12-3 今天

退房日期 2012-12-4 明天

酒店位置 街道/地標/建築物

酒店名称 中文/拼音

搜索 机+酒 搜索

MGM GRAND 越南河內萬豪大酒店 五星级综合性度假胜地 2013年初盛大开业

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12.18 12.23 12.24 12.10 12.11 12.12

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“Social Tagging” is a spontaneous (自發的), collaborative work to categorize links by a community of users.

acidente aeroporto almoço alvará amigos arte arte na
rua bh bicicleta buracos camara carro casa ccsp chuva
corredor cruzamento cultura custo debate dia a dia
dia-a-dia discriminação duas rodas entrevista
estacionamento eu faixa fala familia favela festa foto
gasolina injustiça isa lazer manifestação marginal minha vida
moradores da rua motoboy motogirl motos natureza noticia
ocupaçao da usp onibus paisagem papa pedestre periferia
perigo policia poluição prejuizo proibido radar refeição resgate
reunião rotina samba segurança serviço sinalização sindicato
sonho são paulo torcida trabalho transito tv vista Óleo

- Classification Design
- Navigation Design
- Search Design
- Layout and Design

- 兼具規律與多樣性



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Navigation Design

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- Design for the reader
- Provide a variety of navigation options
- Let readers know where they are
- Let readers know where they've been
- Let readers know where they're going
- Be consistent
- Follow web convention
- Facilitate action, feedback and support

Variety of Navigation Options

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The screenshot displays the Yahoo! Taiwan homepage with several navigation elements highlighted:

- Top Navigation Bar:** Includes links for 網頁 (Web), 知識+ (Knowledge+), 圖片 (Images), 部落格 (Blogs), 商家 NEW (Business), 購物 (Shopping), 食譜 (Recipes), 新聞 (News), and 字典 (Dictionary).
- Search Bar:** A search input field with a yellow "網頁搜尋" (Web Search) button.
- Service List (Left Sidebar):** A red box highlights the "服務列表" (Service List) section, which contains links for 新聞 (News), 股市 (Stocks), 理財 (Finance), 運動 (Sports), **名人娛樂** (Celebrity Entertainment), 電影 (Movies), 音樂 (Music), 遊戲 (Games), 社群遊戲 (Social Games), 交友 (Friends), **無名小站** (Anonymous Station), 部落格 (Blogs), **無名相簿** (Anonymous Photo Album), **字典** (Dictionary), **信箱** (Email), and **氣象** (Weather). The "全部" (All) link is also visible.
- Main Content Area:** Features a news banner with a photo of a man speaking, followed by sections for 紐約市長 (New York Mayor), 護漁耗油 (Oil Pollution Protection), and other news items. It also includes a "拍賣" (Auction) section with a "CB嚴選" (CB Selection) banner for women's clothing.
- Bottom Navigation Bar:** Includes 購物中心 (Shopping Center), 超級商城 (Super Mall), 拍賣 (Auction), and 活動特報 (Promotional Report).
- Advertisement:** A large advertisement for "我的幸福進行式" (My Happy Journey) featuring a sofa and two birds.



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- Core: allow you focus on classification you selected
- Global: keeps major classifications available at all time

United States

Search

IBM Solutions Services Products Support & downloads My IBM

Fingertips figure into sales

See how tablets and smart phones are shaping Black Friday and Cyber Monday

[Read the complete report →](#)

@IBM: The Mobile World is Open for Business - PDF: <http://t.co/9khEfeAQ>



Let's build a smarter planet
Explore by smarter industry or topic

Know the person, not the persona
Get the white paper on customer analytics

Innovation explanations
IBM's Scrut Weber talks about the potential of social media

Connect with us
Create a profile

Key topics
A smarter planet

Information for
C-suite executives

Shop & buy
Special offers

About IBM
Latest news

Popular links
Careers

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Solutions

Services

Products

Support & downloads

My IBM

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IBM Software > Rational >

Rational software

Try Rational Developer for Power Systems Software

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- Training and certification
- Events
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- Agile development
- Collaborative development
- developerWorks
- IBM Business Partners
- ISVs
- Jazz.net
- Rational cafes
- Rational client programs
- Subscription and support
- Rational Software Conference
- Rational Talks to You



Featured solutions

- Smart products and services
- Smarter products for a smarter planet
- Software delivery services for cloud computing
- Solutions for Power Systems Software

Featured trials

- Green Hat acquisition
- Looking for Telelogic?
- Quick links
- @ibmrational on Twitter
- Stay connected

Why Rational software?

IBM Rational helps you transform how you design, develop and deliver both software and software embedded hardware (e.g. software in cars and phones), to create more innovative products and services, faster than your competition, with lower costs and reduced risk. Explore [products by category](#) or see the [products A-Z list](#). Get [Rational support](#).

What we offer

Rational software enables your business to:



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Deliver software at the speed of your business demands.



Deliver smart products

Build smarter, innovative, high quality systems and products.



Streamline multiplatform development

Lower the total cost of multiplatform applications development

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Breadcrumb (麵包屑)



Home > Electronics > Video > TV > Samsung 52-Inch 1080p 120Hz LCD HDTV

- Start with Home
- Use angle bracket >
- Bold and unlink final classification

Why do links change colors?

dmoz open directory project

In partnership with AOL Search.

[about dmoz](#) | [dmoz blog](#) | [report abuse/spam](#) | [help](#)

the entire directory ▾

Top: Arts (203,175) [Description](#)

- [Animation](#) (7,950)
- [Antiques](#) (744)
- [Architecture](#) (2,689)
- [Art History](#) (4,009)
- [Bodyart](#) (673)
- [Classical Studies](#) (362)
- [Comics](#) (3,048)
- [Costumes](#) (30)
- [Crafts](#) (5,581)
- [Dance](#) (4,579)
- [Design](#) (993)
- [Digital](#) (210)
- [Entertainment](#) (392)
- [Graphic Design](#) (457)
- [Humanities](#) (173)
- [Illustration](#) (1,815)
- [Literature](#) (20,351)
- [Movies](#) (29,967)
- [Music](#) (61,876)
- [Myths and Folktales](#) (330)
- [Native and Tribal](#) (377)
- [Online Writing](#) (2,699)
- [Performing Arts](#) (18,412)
- [Photography](#) (3,345)
- [Radio](#) (2,075)
- [Rhetoric](#) (61)
- [Television](#) (8,818)
- [Theatre](#) (4,499)
- [Typography](#) (76)
- [Video](#) (204)
- [Visual Arts](#) (14,703)
- [Writers Resources](#) (2,003)



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- Consistent classification
- Consistent graphical navigation design
- Consistent hypertext colors
- Consistent website structure

- Home
- About
- Contact
- Feedback
- Logo top left
- Footer on every page

- Provide intelligent error checking
- Subject-sensitive help for complex tasks
- Contact link on every page
- ‘Common’ language feedback for errors

Server Error in '/' Application.

You are not allowed to respond again to this survey.

Description: An unhandled exception occurred during the execution of the current web request. Please review the stack trace for more information about the error and where it originated in the code.

Exception Details: System.Runtime.InteropServices.COMException: You are not allowed to respond again to this survey.

Source Error:

An unhandled exception was generated during the execution of the current web request. Information regarding the origin and location of the exception can be identified using the exception stack trace below.

Stack Trace:

```
[COMException (0x81020039): You are not allowed to respond again to this survey.]  
    Microsoft.SharePoint.Library.SPRequestInternalClass.IsVotingAllowed() +0  
    Microsoft.SharePoint.Library.SPRequest.IsVotingAllowed() +106  
  
[SPEException: You are not allowed to respond again to this survey.]  
    Microsoft.SharePoint.Library.SPRequest.IsVotingAllowed() +183  
    Microsoft.SharePoint.WebPartPages.ListFormWebPart.OnInit(EventArgs e) +709  
    System.Web.UI.Control.InitRecursive(Control namingContainer) +333  
    System.Web.UI.Control.AddedControl(Control control, Int32 index) +198  
    System.Web.UI.ControlCollection.Add(Control child) +80  
    System.Web.UI.WebControls.WebParts.WebPartManagerControlCollection.AddWebPartHelper(WebPart webPart) +220  
    System.Web.UI.WebControls.WebParts.WebPartManagerControlCollection.AddWebPart(WebPart webPart) +108  
    System.Web.UI.WebControls.WebParts.WebPartManager.AddWebPart(WebPart webPart) +55  
    System.Web.UI.WebControls.WebParts.WebPartManagerInternals.AddWebPart(WebPart webPart) +11  
    Microsoft.SharePoint.WebPartPages.SPWebPartManager.AddWebPartWithRetry(WebPart webPart) +184  
    Microsoft.SharePoint.WebPartPages.SPWebPartManager.AddDynamicWebPart(WebPart webPart) +86  
    Microsoft.SharePoint.WebPartPages.SPWebPartManager.CreateWebPartsFromRowSetData(Boolean onlyInitializeClosedWebParts) +8057  
    Microsoft.SharePoint.WebPartPages.SPWebPartManager.LoadWebParts() +63  
    Microsoft.SharePoint.WebPartPages.SPWebPartManager.OnPageInitComplete(Object sender, EventArgs e) +409  
    System.EventHandler.Invoke(Object sender, EventArgs e) +0  
    System.Web.UI.Page.OnInitComplete(EventArgs e) +8698006  
    System.Web.UI.Page.ProcessRequestMain(Boolean includeStagesBeforeAsyncPoint, Boolean includeStagesAfterAsyncPoint) +467
```

Version Information: Microsoft .NET Framework Version:2.0.50727.3082; ASP.NET Version:2.0.50727.3082

- Don't ask them to do things they can't do
- Implement the 'Three-click rule'

※ Three-click rule: 網站使用者在不超過三次滑鼠點擊內，就能找到任何他想找的資訊。

Progress chart navigation should be used whenever a reader is asked to carry out a process involving more than two steps



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- Classification Design
- Navigation Design
- **Search Design**
- Layout and Design

“Knowledge workers spend **15-30%** of their day **searching** for information.”



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More than **half** of
their online
searches **fail**



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1.	2 word phrases	32.58%
2.	3 word phrases	25.61%
3.	1 word phrases	19.02%
4.	4 word phrases	12.83%
5.	5 word phrases	5.67%
6.	6 word phrases	2.32%
7.	7 word phrases	0.98%

http://www.onestat.com/html/aboutus_pressbox27.html



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- Accessible from **every page**
- Search should default to searching the **entire site**
- Make sure the website is **regularly re-indexed**
- Provide “**best bets**”
- Located in the **top right** of page, or near **top left**, just underneath the logo
- Deal with **input errors**

- Search box sufficiently large to allow **25-30 characters** to be entered
- The ideal font for the search is **Arial**
- **10 point** font size in box
- Button to the right of the search box labeled “**Search**”
- If button is labeled “**Go**”, then have little above search box labeled “**Search**”

- Synonym expansion (notebook / laptop)
- American vs. European English
- Plural and singular words
- Parsing errors (all capitals, spaces, etc.)
- Typos
 - Common spelling mistakes

中文	European	American
逆時針方向的	Anticlockwise	Counterclockwise
垃圾桶	Bin	Trash can
餅乾	Biscuit	Cookie
洋芋片	Crisps	Potato chips

來源：[Some vocabulary differences between European and American English](#)



Britney Spears misspellings - Google

PROFESSIONAL INNOVATION COLLABORATION

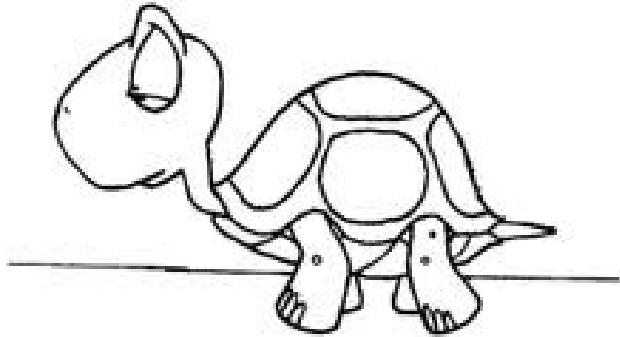
488941 britney spears	364 brittany spears	98 britney spears	48 bitany spears
40134 brittany spears	329 brtney spears	98 brittiany spears	48 briny spears
36315 brittney spears	269 bretney spears	98 btitney spears	48 birney spears
24342 britany spears	269 britneys spears	89 brietny spears	48 britant spears
7331 britny spears	244 britne spears	89 brinety spears	48 britnety spears
6633 briteny spears	244 brytney spears	89 brintny spears	48 brittanny spears
2696 britteny spears	220 breatney spears	89 britnie spears	48 brttney spears
1807 briney spears	220 britiany spears	89 brittey spears	44 birttany spears
1635 brittny spears	199 britnney spears	89 brittnet spears	44 brittani spears
1479 brintey spears	163 britnry spears	89 brity spears	44 brityney spears
1479 britanny spears	147 breatny spears	89 ritney spears	44 brtitney spears
1338 britiny spears	147 brittiney spears	80 bretny spears	39 brienty spears
1211 britnet spears	147 britty spears	80 britnany spears	39 brritney spears
1096 britiney spears	147 brotny spears	73 brinteny spears	36 bbritney spears
991 britaney spears	147 brutney spears	73 brittainy spears	36 briitany spears
991 britnay spears	133 britteney spears	73 pritney spears	36 brittanney spears
811 brithney spears	133 briyney spears	66 brintany spears	36 briterny spears
811 brtiney spears	121 bittany spears	66 britnery spears	36 britneey spears
664 birtney spears	121 bridney spears	59 briitney spears	36 britnei spears
664 brintney spears	121 britainy spears	59 britinay spears	36 britniy spears
664 briteney spears	121 britmey spears	54 britneay spears	32 britbey spears
601 bitney spears	109 brietney spears	54 britner spears	32 britneu spears
601 brinty spears	109 brithny spears	54 britney's spears	29 britent spears
544 brittaney spears	109 britni spears	54 britnye spears	29 brittnany spears
544 brittnay spears	109 brittant spears	54 britt spears	29 britttany spears
364 britey spears	98 bittney spears	54 brttany spears	29 btiney spears



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- Classification Design
- Navigation Design
- Search Design
- Layout and Design



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Google

台灣

Google 搜尋

好手氣

愛好自由開放的網路嗎？告訴全世界的政府讓它保有這項特質



11 KB

*“We count **bytes** because our users have **modems**, so it costs them to download our pages.” - Urs Hözle, Google*



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- Reading from a computer screen is about **25%** slower than reading from paper.
- Write **50%** less text than you would normally write for a brochure or paper.



PIC

[Guidelines for GOOD
Web Design by Patrick Douglas Crispen](#)

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Loregrey**m Ipsum Dolor Sit**

Lore*grey* ipsum dolor sit amet, consectetuer adipiscing elit. Phasellus sed tellus. Mauris porttitor, massa vel facilisis sagittis, arcu mauris pretium dui, ac malesuada pede est quis risus. Praesent augue ipsum, dictum in, lacinia non, consequat ut, risus.

Lore*black*m Ipsum Dolor Sit

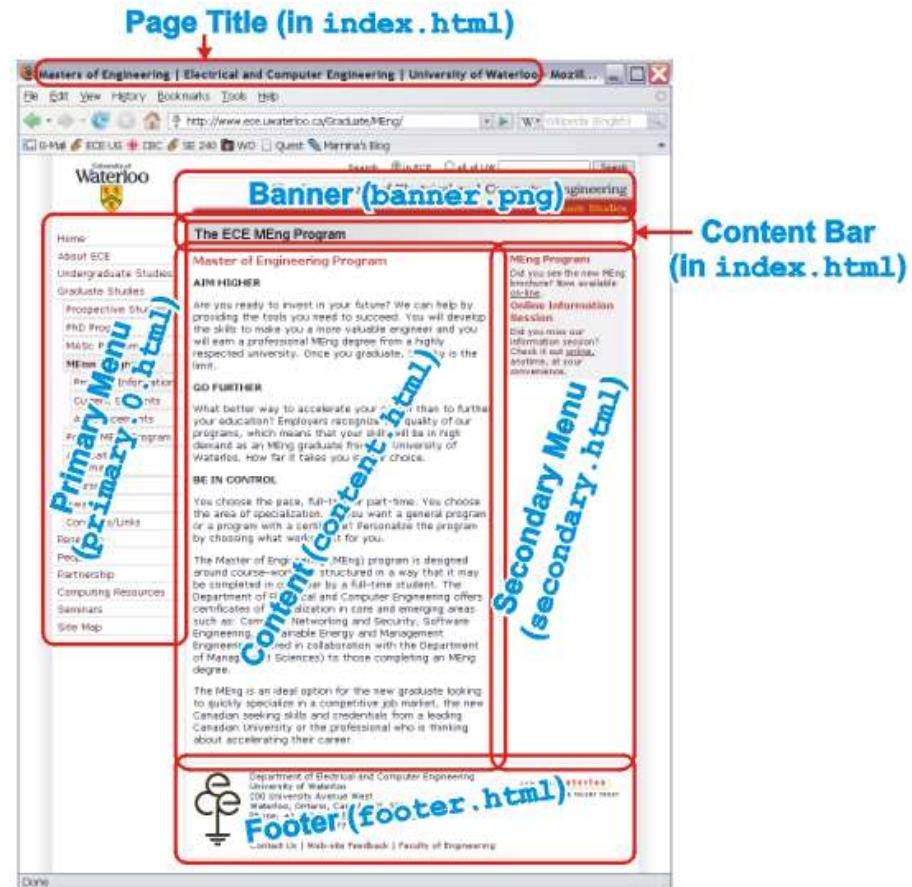
Lore*black* ipsum dolor sit amet, consectetuer adipiscing elit. Phasellus sed tellus. Mauris porttitor, massa vel facilisis sagittis, arcu mauris pretium dui, ac malesuada pede est quis risus. Praesent augue ipsum, dictum in, lacinia non, consequat ut, risus.



- 1024 x 768 page dimensions
- Provide wide screen option, 1280 x 800
- Avoid using italics
- Avoid using bold within body text
- Never use underline (unless it's a link)
- Choose sans serif fonts
- Avoid using small font sizes
- Avoid things that move
- Avoid splash screens

- Small in actual size and file size: 10 KB or less
- Use thumbnails for larger images
- ALT text for all images
- Compress well

- Three column layout
- Make sure navigation and search are prominent
- Keep the page ‘light’
- Use slim mastheads



- Slim masthead – 70-90 pixels deep, containing:
 - Logo of organization, name of department, subdivision, etc.
 - Global navigation
 - Ecommerce navigation
 - May also contain the search facility



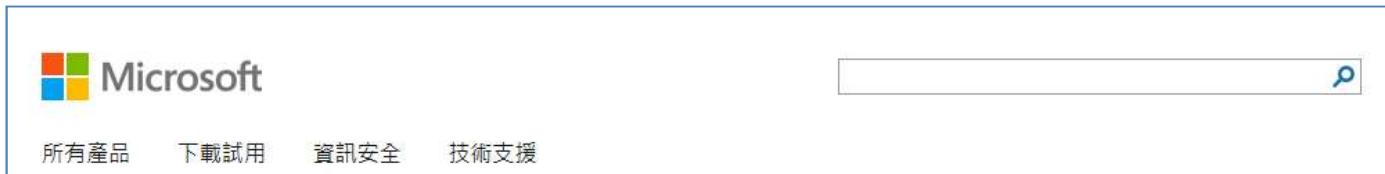
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Mastheads

PROFESSIONAL INNOVATION COLLABORATION

Height
(pixels)



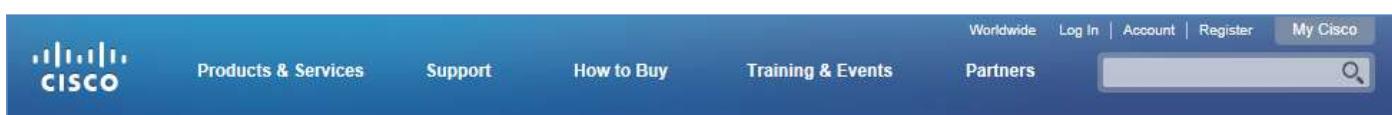
The Microsoft homepage features a large Microsoft logo at the top left. Below it is a search bar with a magnifying glass icon. Underneath the search bar are four navigation links: '所有產品', '下載試用', '資訊安全', and '技術支援'.

125



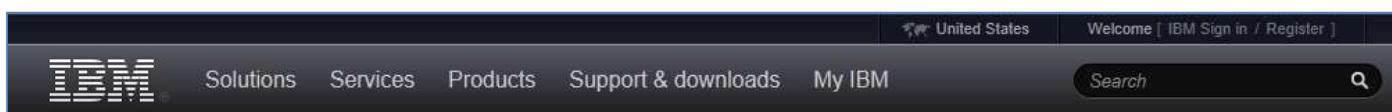
This screenshot shows a modal dialog box asking if the user wants to make the International Edition their default edition. It includes 'Yes' and 'No' buttons and a 'Close X' button. Above the dialog, the CNN logo is visible. The page also displays edition selection options like 'INTERNATIONAL', 'U.S.', 'MÉXICO', and 'ARABIC', and language options 'TV: CNNi' and 'CNN en Español'. A navigation bar below includes links for Home, Video, World, U.S., Africa, Asia, Europe, Latin America, Middle East, Business, World Sport, Entertainment, Tech, Travel, and iReport.

176



The Cisco homepage has a dark blue header with the Cisco logo on the left. To its right are links for 'Products & Services', 'Support', 'How to Buy', 'Training & Events', and 'Partners'. On the far right of the header are links for 'Worldwide', 'Log In', 'Account', 'Register', and 'My Cisco', along with a search bar.

74



The IBM homepage features a dark header with the IBM logo on the left. To its right are links for 'Solutions', 'Services', 'Products', 'Support & downloads', and 'My IBM'. On the far right is a search bar with a magnifying glass icon.

74



The AOL homepage has a colorful, abstract background featuring the AOL logo. At the top, there's a welcome message 'Welcome -- Make This Your Homepage' and links for 'New Here?', 'Sign Up', 'Weather Set Location', 'Change Canvas', and 'Sign In' with an American flag icon. Below the header is a search bar with a pink 'Search' button. The main menu at the bottom includes 'NEWS', 'ENTERTAINMENT', 'FINANCE', 'TECH', 'LIFESTYLE', 'SHOP', 'SERVICES', 'GAMES', 'AUTOS', 'MAPS', 'LOCAL', 'RADIO', and 'MORE'.

150



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85

- Global navigation as text
- Contact information
- Feedback statement and link
- A “Terms of use” link
- A “Privacy policy” link
- A “Copyright © 1995-2000 Example Company. All rights reserved.” link

- Use three-column layout (guarantees ‘printable’)
- Present appropriate metadata
 - Date, author, headline, etc
- Black sans serif text on white background
- 9-12 words per line ideal
- 10 point font minimum
- Sub-headings in longer documents
- Use ‘pull quotes’
- Scrolling is ok, but don’t scroll more than 5 screens
- Printer-friendly version
- Email document facility

The 3 Principles of IA

1. To help find content **quickly**
2. To put content in **context**
3. To make content **readable**

3. DESIGN FOR PERFORMANCE

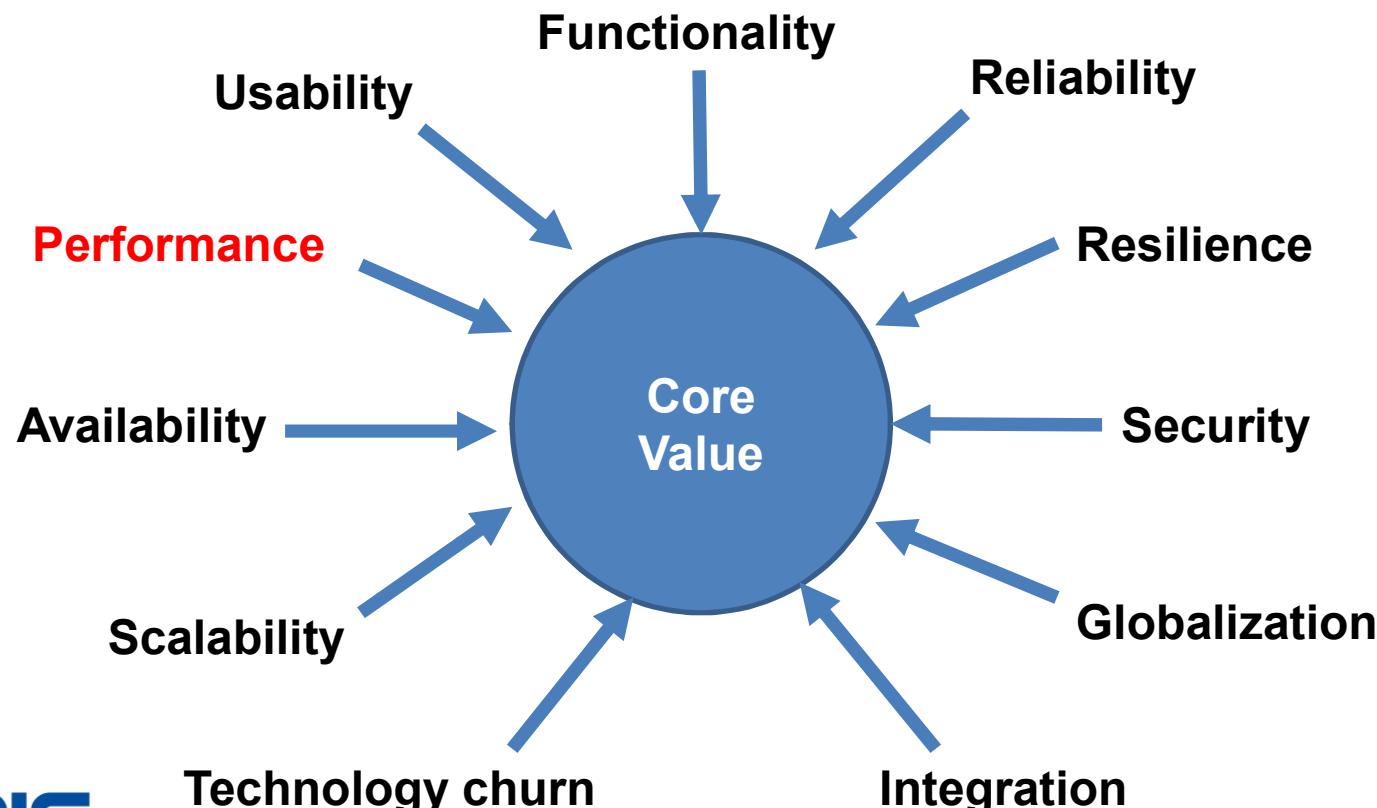


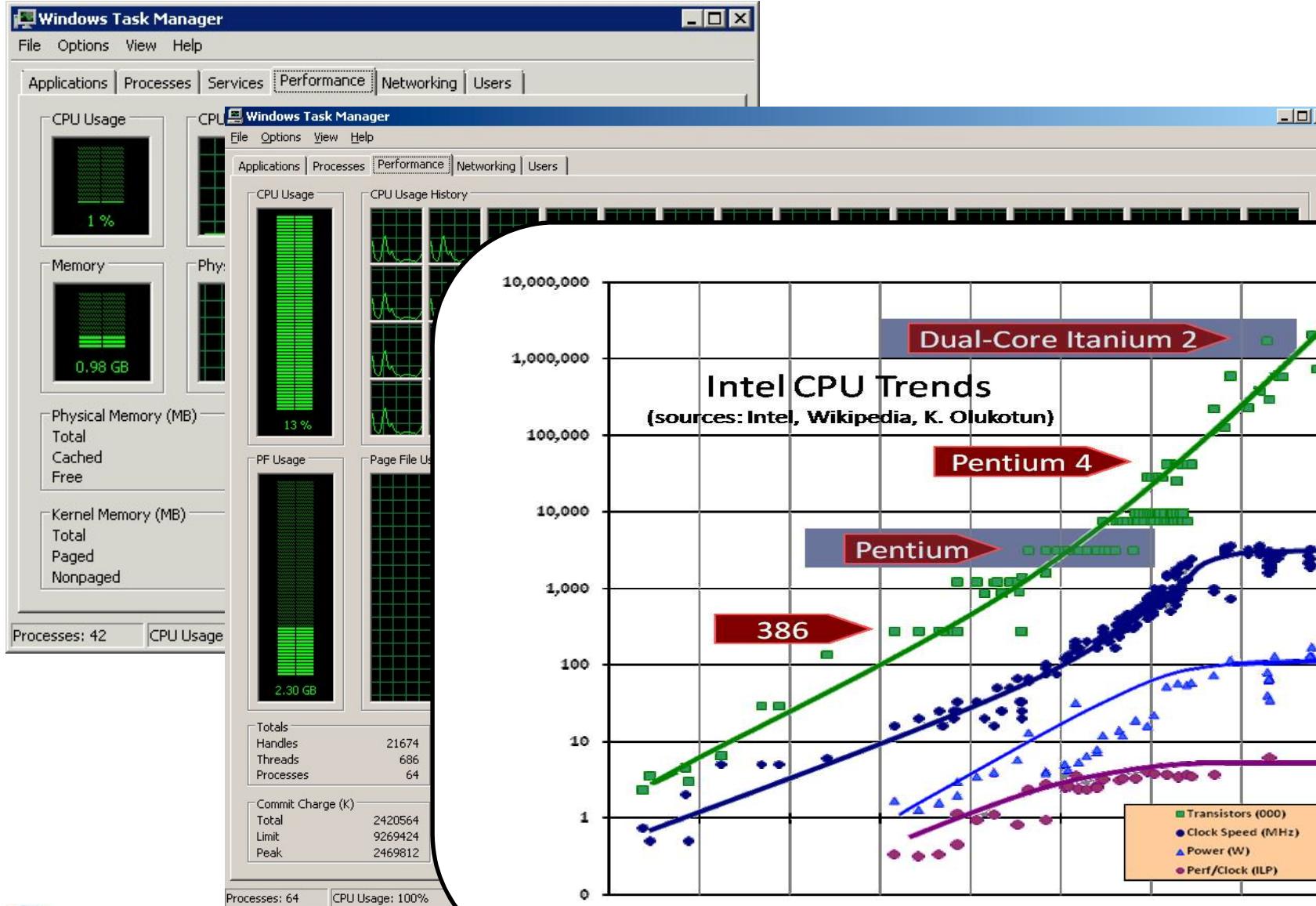
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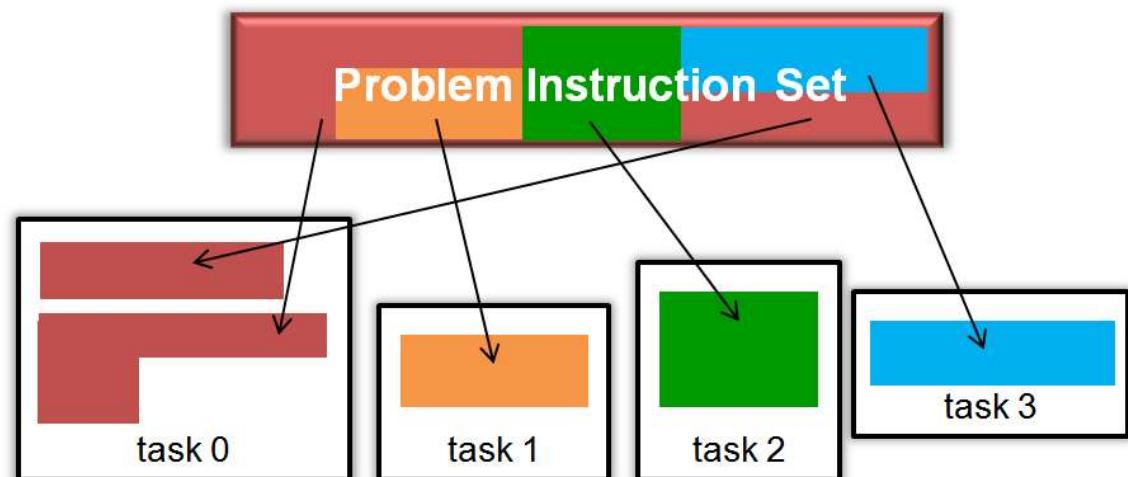
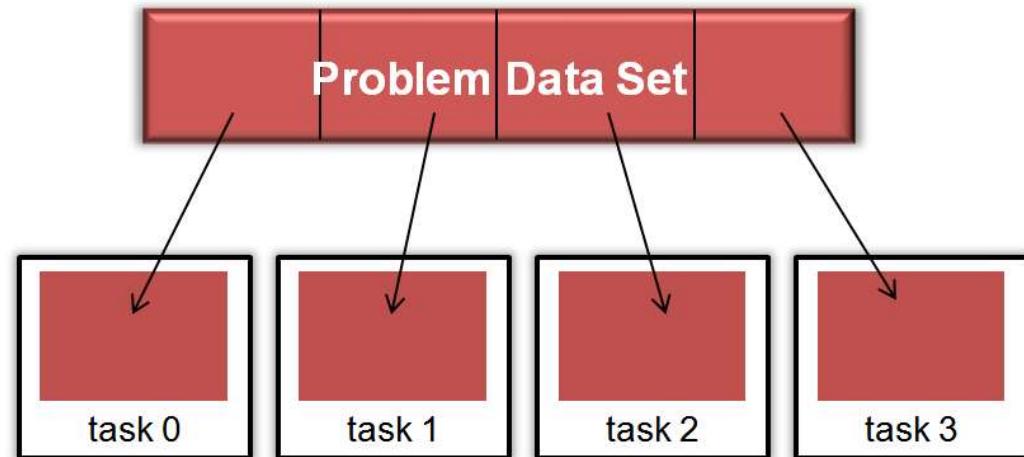
➡ Parallelism

- Design Guidelines
- Performance Testing





- Data-driven splitting
- Functional splitting



- **Parallel processing means splitting large problem into parts**
 - Splitting overhead
 - The more “splitting” the more effort
 - Coordination overhead
 - Merging result overhead

Parallel Loops for Simplified Programming

PROFESSIONAL INNOVATION COLLABORATION

- Parallel execution in control structures
 - Typical examples for sources of parallel work

```
for (i = 0; i < n; i++)  
{  
    work(i);  
}
```

```
foreach (var item in data)  
{  
    work(item);  
}
```

```
StatementA();  
StatementB();  
StatementC();
```

- New possibilities in the .NET framework 4.0

```
Parallel.For (0, n, i=>  
{  
    work(i);  
});
```

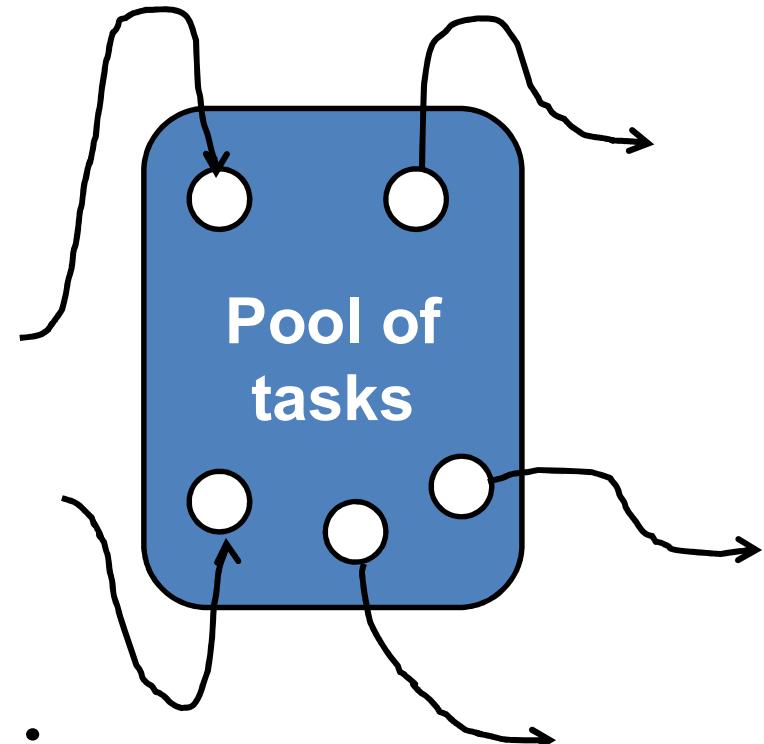
```
Parallel.ForEach (data, item  
=>  
{  
    work(item);  
});
```

```
Parallel.Invoke(  
    () => StatementA(),  
    () => StatementB(),  
    () => StatementC());
```

- Simplest Way for Parallel Execution

```
ThreadPool.QueueUserWorkItem(s =>
{
    // ... do your actions here ...
}, status);
```

Fire-and-forget
You need to synchronize



(input parameters) => expression

(int i, string s) => s.Length > i

```
bool MyFunc(int i, string s)
{
    return s.Length > i;
}
```

(input parameters) => {statement;}

```
(int i, string s) => {
    Console.WriteLine(
        "str: {0} int: {i}", s, i);
}
```

```
void MyAction(int i, string s)
{
    Console.WriteLine(
        "str: {0} int: {i}", s, i);
}
```



PIC

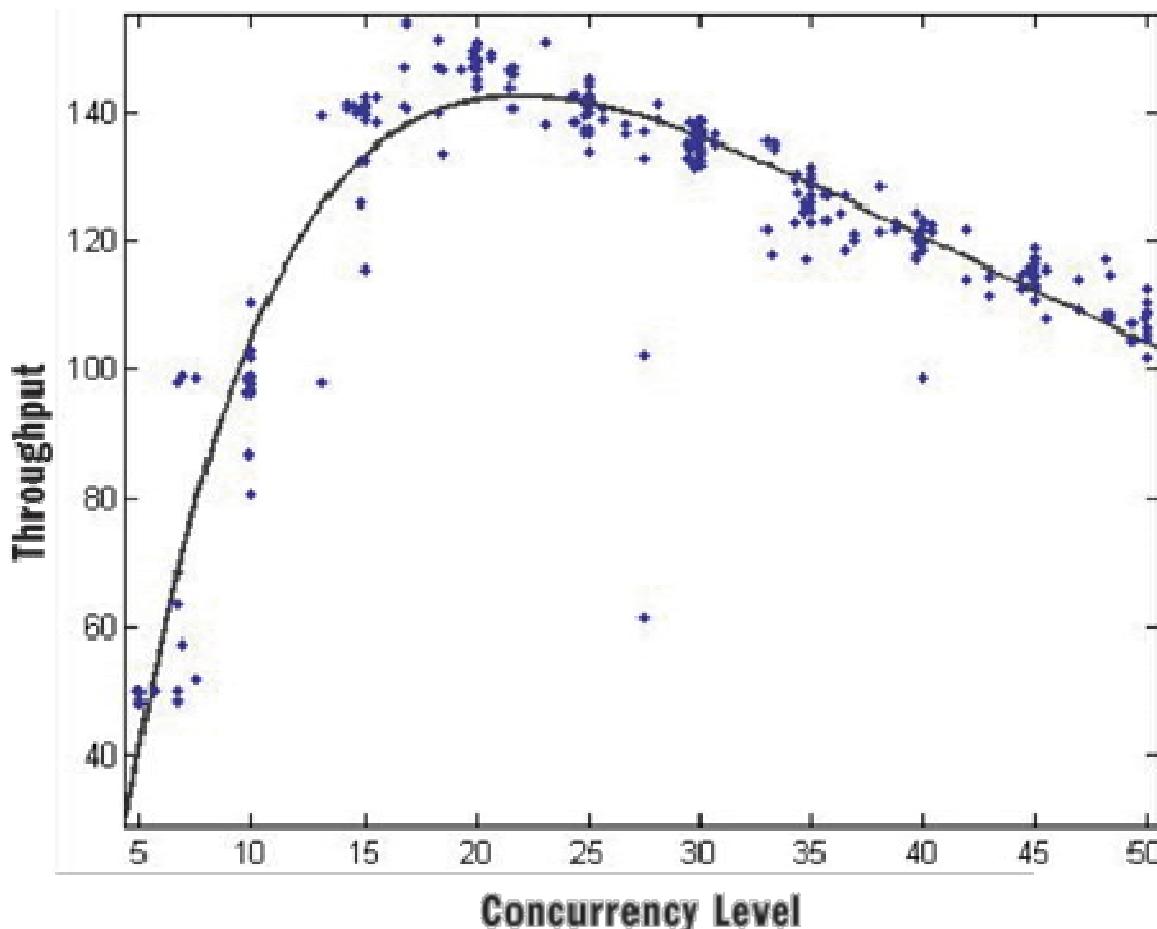
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<https://msdn.microsoft.com/zh-tw/library/bb397687.aspx>

<http://docs.oracle.com/javase/tutorial/java/javaOO/lambdaexpressions.html>

More Parallelism != Better Performance

PROFESSIONAL INNOVATION COLLABORATION



Reasons for performance degradation:

1. Context switches
2. Memory contention
3. Hot locks
4. Disk contention
5. Network contention

Work items with 10% CPU on a dual core system
using `ThreadPool.QueueUserWorkItem()`.

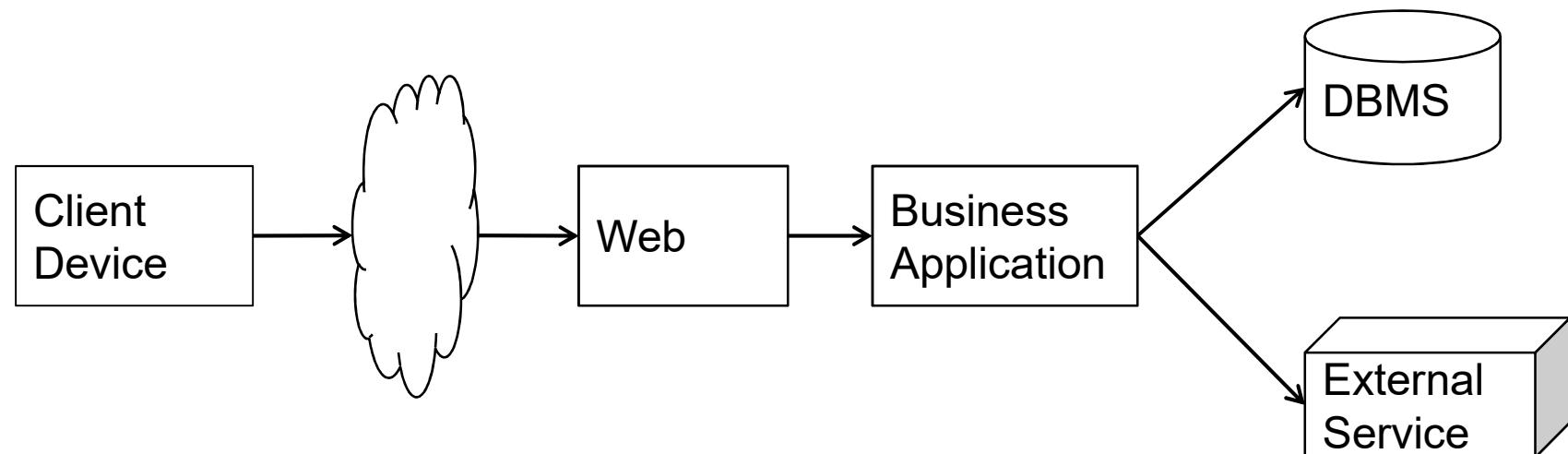
- Parallelism
- ➡ **Design Guidelines**
- Performance Testing



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- A user places an order in web shop
- If users asks for response in 3 seconds, how you define and design the system to meet the requirement?



- Partition your application into independent tasks
 - Multi-machine
- Design efficient algorithm
- Put computing near data
- Manage resource
- Use caching
- Balance security and performance
- Avoid blocking on long-running tasks
- Reduce roundtrips
- Avoid unnecessary exceptions



- Separate static and dynamic page
- Cache page parts
- Light weight data transfer between Web & Browser
 - Transfer and encrypt necessary fields
- Do not refresh total page all times
- Make use of browser's computing power
 - Javascript or else



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- Use paging for large result sets
- Transform data from RDB by self (ex. .NET DataReader)
- Prevent users from requesting too much data
- Consider caching data
- Consider offload RDB to simpler storage

- Turn off authentication for anonymous access
- Validate user input on the client
- Avoid caching sensitive data
- Segregate secure and non-secure content
- Only use SSL for pages that require it
- Use absolute URLs for navigation between HTTP & HTTPS pages
- Consider using SSL hardware to offload SSL processing
- Tune SSL timeout to avoid SSL session expiration

- Parallelism
- Design Guidelines

➡ **Performance Testing**



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- Identify key scenarios
- Identify workload
- Identify metrics
- Create test cases
- Process test
- Analyze the results
- Report

- Log on to the application.
- Browse a product catalog.
- Search for a specific product.
- Add items to the shopping cart.
- Validate credit card details and place an order.

- Numbers of users
 - The total number of concurrent users accessing the application in a given time frame
- Rate of requests

- Network specific metrics
- System related metrics
- Perform specific metrics
- Application specific metrics
- Service level metrics

System Metric	Accepted level
% CPU Usage	Must not exceed 60%
Requests / second	100 or more
Response time	< 2 seconds

Service Level Metric	Value
Orders per second	70
Unique browsers per second	130



- Sample E-Commerce Application
- Expected Results under the load profile below
 - Throughput: 100 Requests/sec
 - Requests Executing: 45 Requests executing
 - Response Time: 2.5 sec
 - Resource utilization thresholds:
 - %Processor Time: 75%
 - Memory %: 25% of total physical memory

User scenarios	Percentage of users	Users
Browse	50	250
Search	30	150
Place order	20	100
Total	100	150

1. Create scripts
2. Modify scripts or configure scripts
 - User delays
 - User patterns: different paths
 - Group of users: customer, sales, admins
 - Distribution of activities: ex. start time
 - Abandon ratio
3. Avoid script failure
 - Data
 - Navigation
 - Data correlation
 - Security issues: Authorization / Authentication
4. Load data
5. Run the tests and collect data



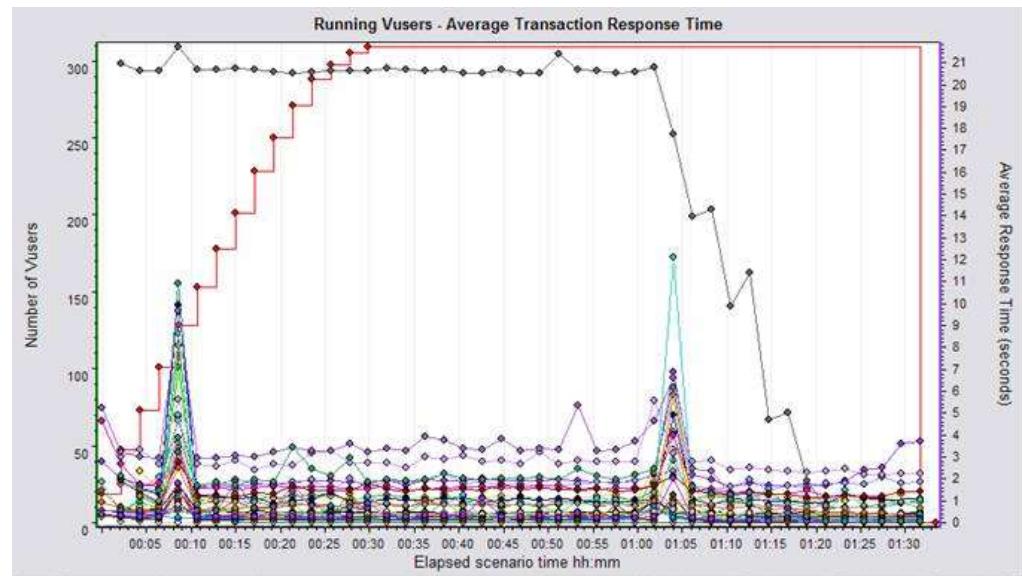
- Analyze the captured data and compare the results against the metric's accepted level.
- The data you collect helps you analyze your application with respect to your application's performance objectives:
 - Throughput vs. User load.
 - Response time vs. User load.
 - Resource utilization vs. User load.



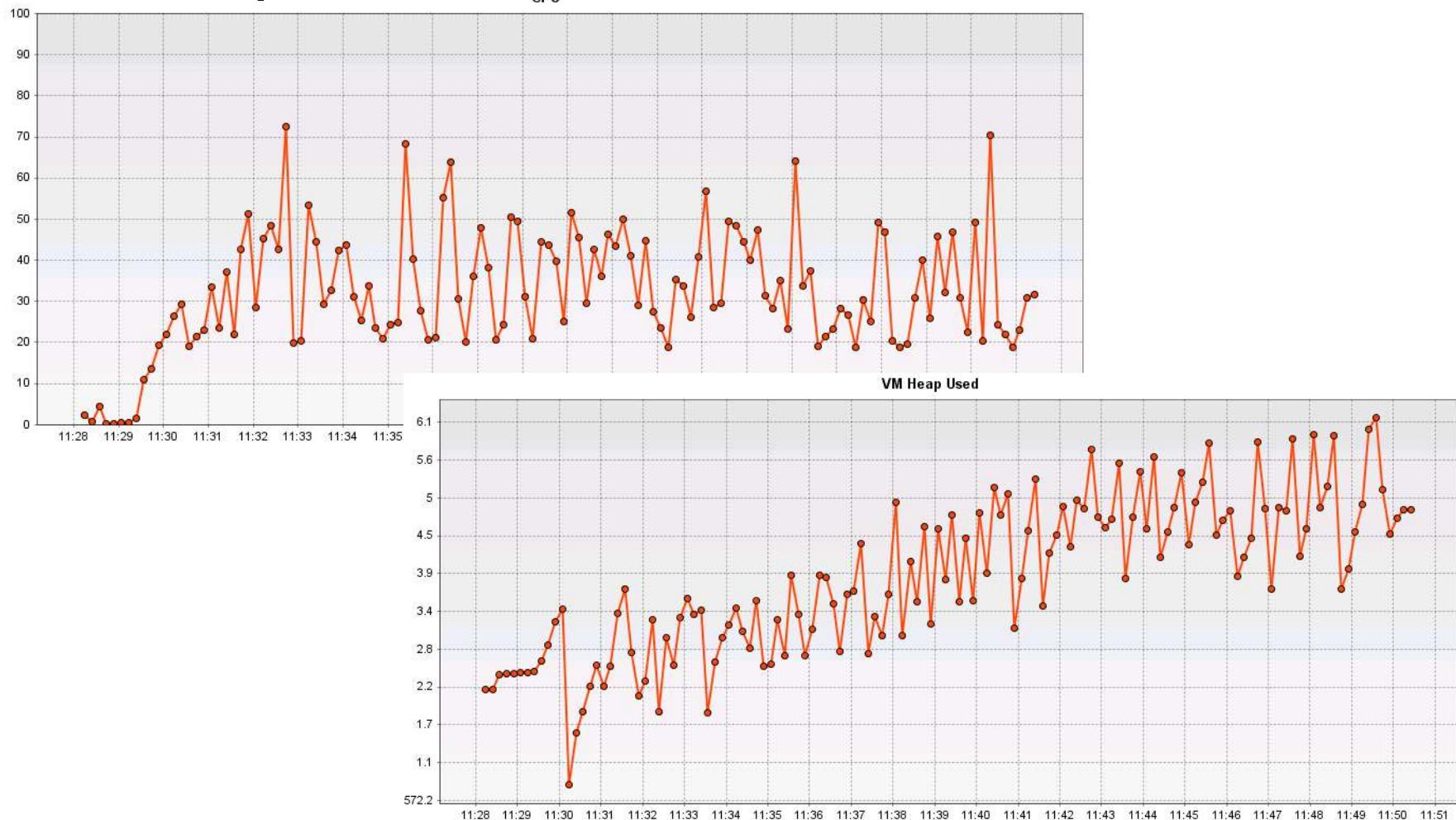
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- Proper design and execution of tests as well as proper measurement of system and/or component activities make the analysis easier



- Multiple Performance Index



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1. Hardware details
2. Software details
3. Configuration details
4. Workload profile
5. Performance objectives
6. Metrics
 - System metrics
 - Web server metrics
7. Analysis

- Design high performance system based on business goal
- Go get necessary resources
- Take care of system architecture down to code level

4. RELIABILITY & AVAILABILITY

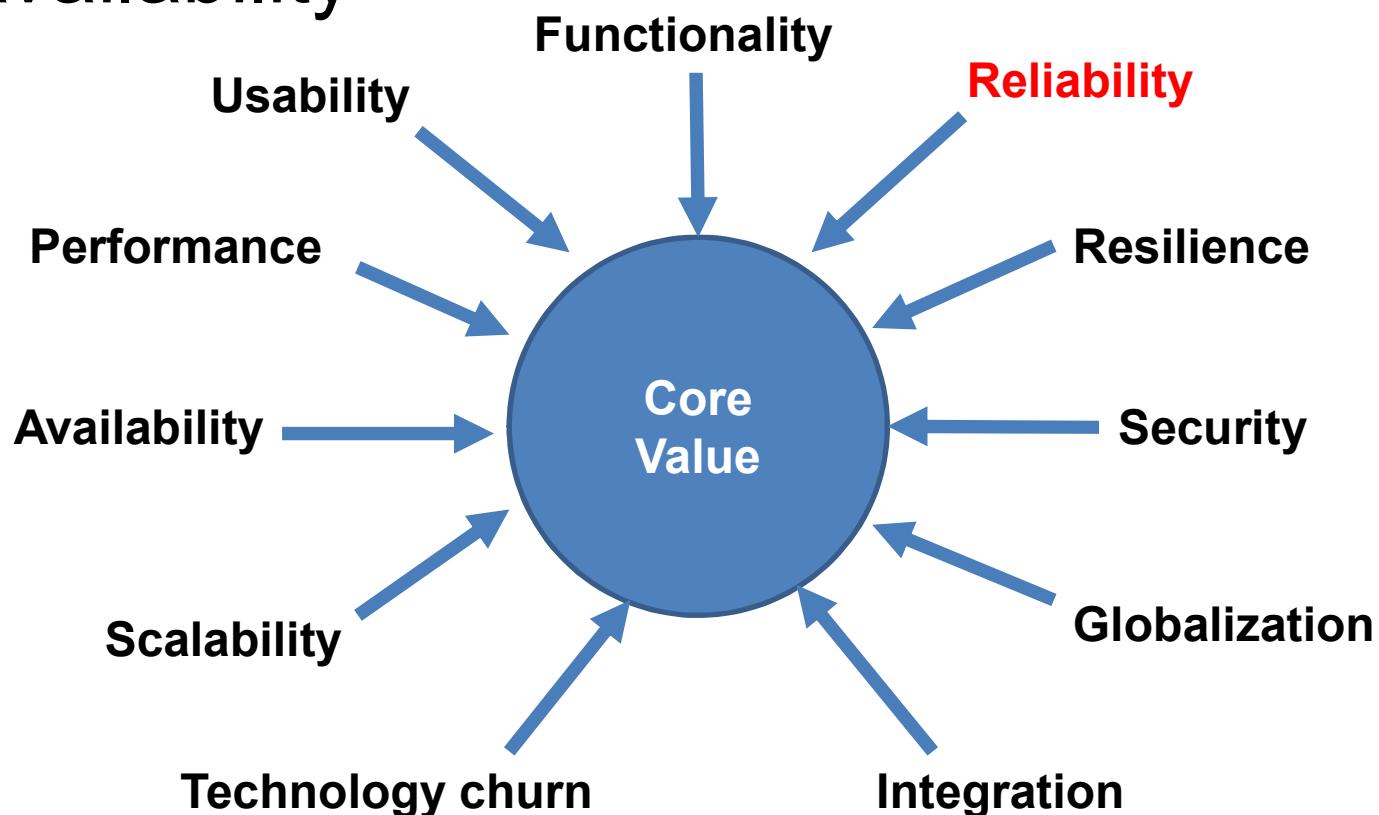


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→ Reliability

- Focus on program
- Availability



- **Fault avoidance**
 - Compute correctly
- **Fault detection**
 - Detect errors or exceptions, and handle them
- **Fault tolerance**
 - Keep performance downgrade gracefully when loading exceeds capacity

- User mistypes input
- Web page not available
- Array index out of bounds
- Method called on a null object
- File not found
- Divide by zero
- Out of memory
- Bug in the actual language implementation

checked

unchecked

sys errors

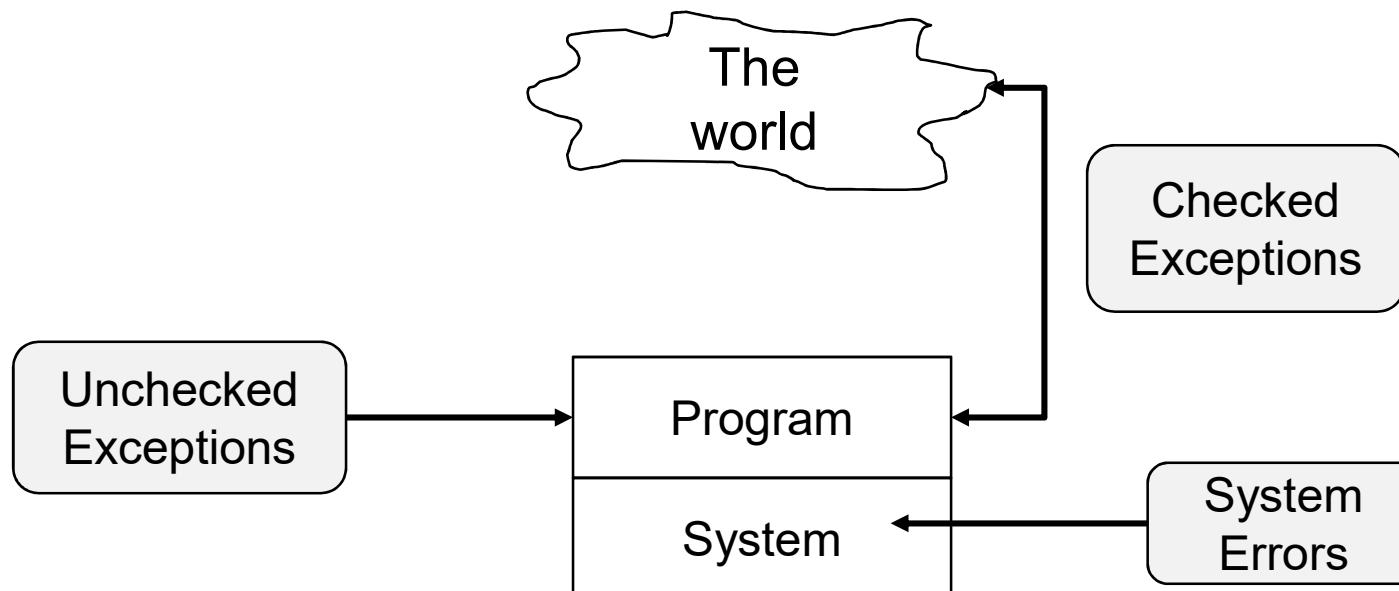
Exceptions are unexpected conditions in programs.



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1. Checked exceptions
2. Unchecked exceptions (runtime exception)
3. System errors



- Gather information
- Use **try/catch**
 - Add any relevant information to the exception
 - Execute cleanup code
 - Try to recover
 - Rethrow to upper level code

- Should meet security, and performance requirements.
- Do catch exceptions if you want to do something.
- Generally, handle exceptions only at an application boundary, not in low-level components.
- Make exceptions as accurate as possible and allow for specific actions to be taken when the exception is raised.
- Error messages that are displayed to users should be relevant and they should suggest the corrective action to take.

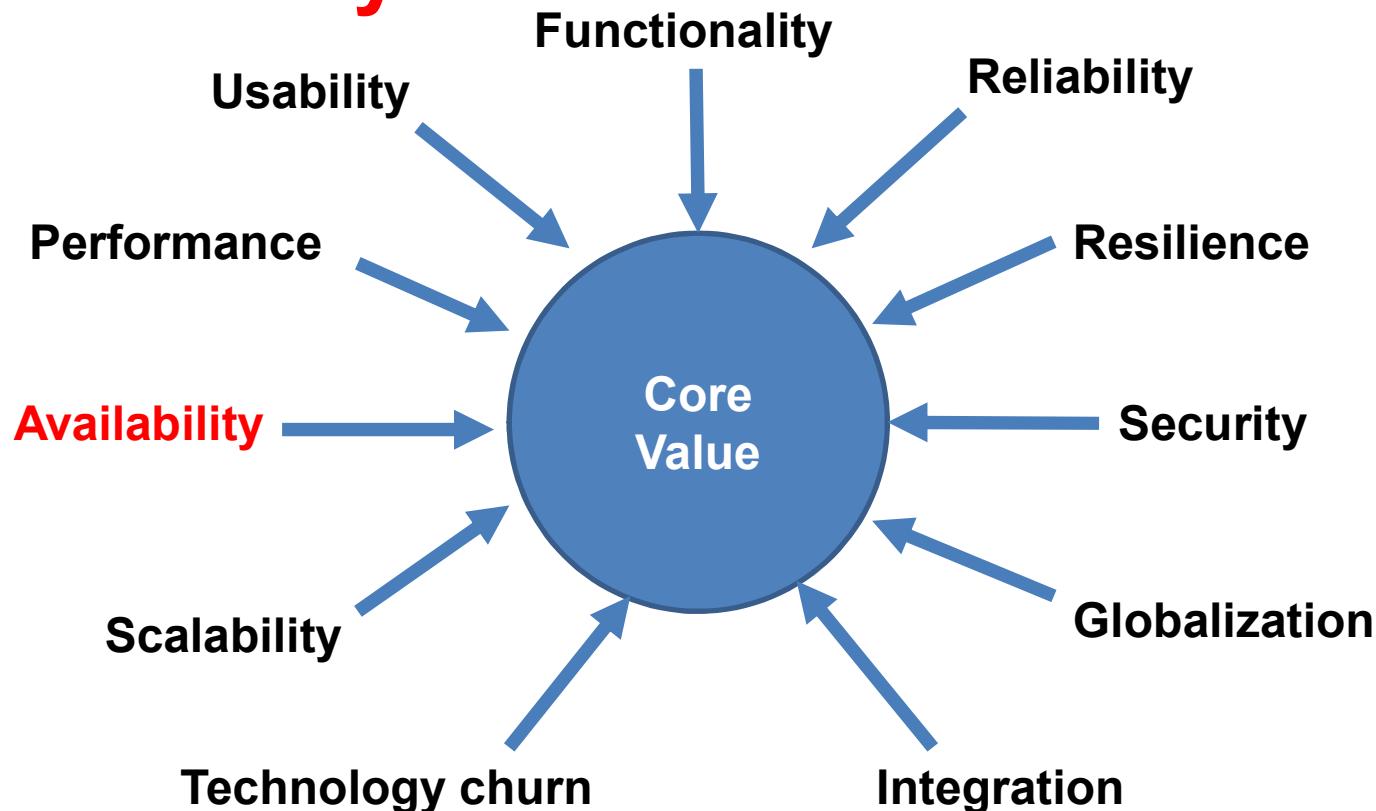


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- Reliability
 - Focus on program

➡ Availability



Availability Metrics

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Availability	Avail (%)	#Nines	Downtime annually	In units of
0.99	99%	2	3.6525	days
0.999	99.9%	3	8.766	hours
0.9999	99.99%	4	52.596	minutes
0.99999	99.999%	5	315.576	seconds

- The [**Uptime Institute**](#) has produced a white paper which classifies datacenters into **4** Tiers
 - **Tier I** (Basic)
 - **Tier II** (Redundant Capacity Component)
 - **Tier III** (Concurrently Maintainable)
 - **Tier IV** (Fault Tolerant and Concurrently Maintainable)
- Current(2010) datacenter with Best Practices (**Tier IV**) in place can do “**4 Nines**” at best



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Uptime Institute®

Data Center needs:

- UPS
- Generator
- Reserve capacity for A/C
- Power from two substations
- Redundant UPS, Generator
- Dual power connections to requirement
- Redundant cooling



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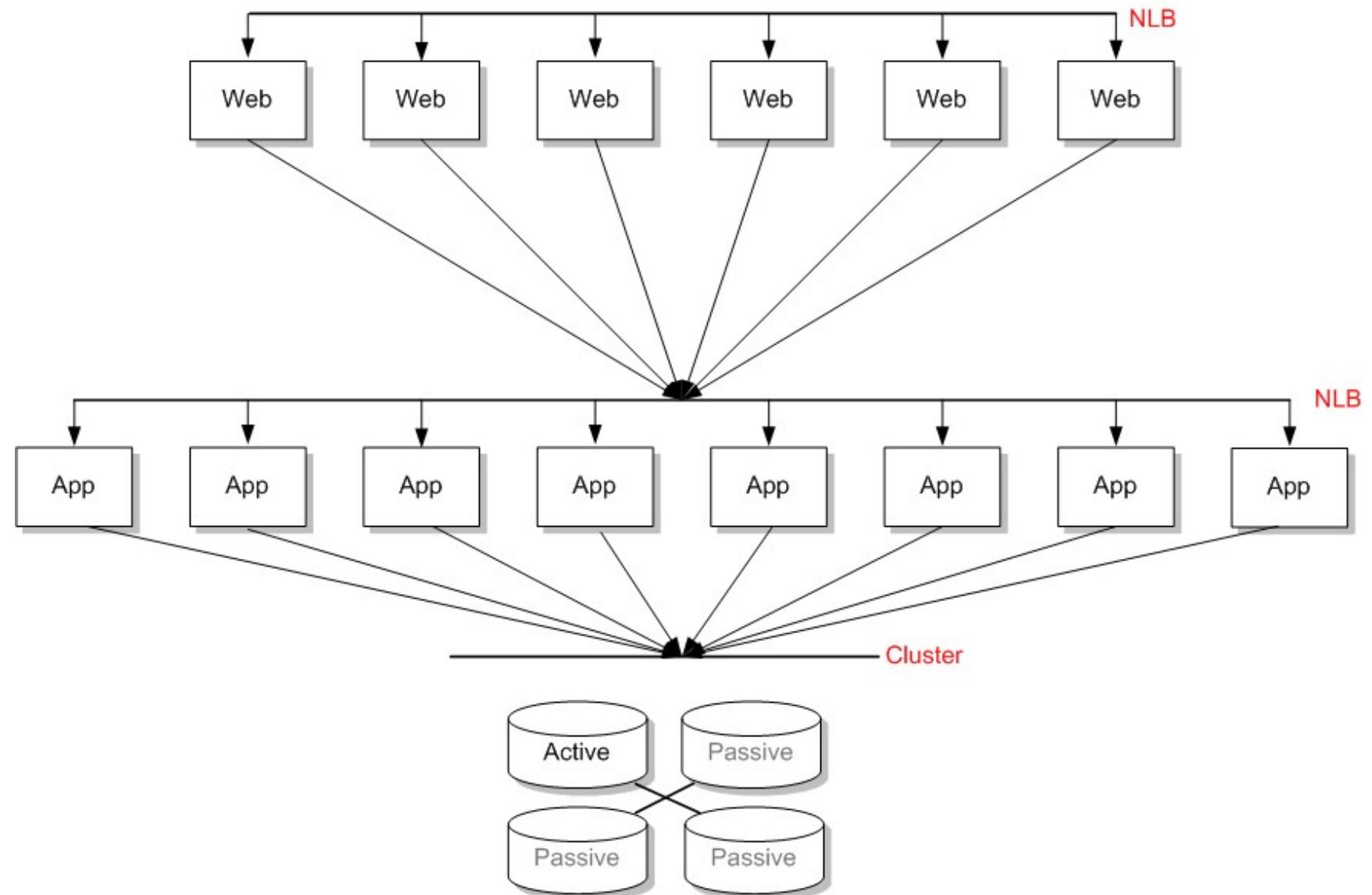
- A single point of failure (**SPOF**) is a part of a system that, if it fails, will stop the **entire system** from working
- Can't depend on anything of which there is **only one**



- Cover the **most-often-failing** components first, using **redundancy**
- Also consider consequences of failure of any component, however unlikely
 - Even things thought to be very reliable and proven can still sometimes fail
- Design to accommodate a failure of any component

3-Tiered Architecture Deployment

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- Two Camps for High available Solutions

Clustering

Cluster Server

Stateful

Strong awareness of other parts

Ex: Web/DB/Storage Cluster
Server

Load Balancing

NLB

Stateless

Loose Awareness of other parts

Ex: IP Load balancer / Round-Robin DNS



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- Configure extra capacity to smoothly ride through peaks in workload
- Running at or near saturation presents additional risks



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Self developed software

- Newly-written software
- New features in existing software
- Recent fixes for bugs
- Old code which has worked for years, but around which the environment has changed recently in some way

- Don't be **the first** to use a new product or technology
- If it's working well, don't throw it away
- Don't be **the last** to continue using an old technology
- Reliability of products tends to get better over time as improvements are made

Reduce the extent of impact of a failure

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- Preserve the independence of different resources
- Division of services into portions so that failure of one portion doesn't affect all portions
- Be cautious about sharing resources among unrelated services, despite the lure (誘惑) of cost savings



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- Plan for regular, periodic scheduled downtime for various maintenance activities.
- Do cluster configuration and application design or re-design with availability in mind.
- In most cases, you **WILL** have downtime. Your choice is whether you want it to be mostly **scheduled**, or **unscheduled** downtime.



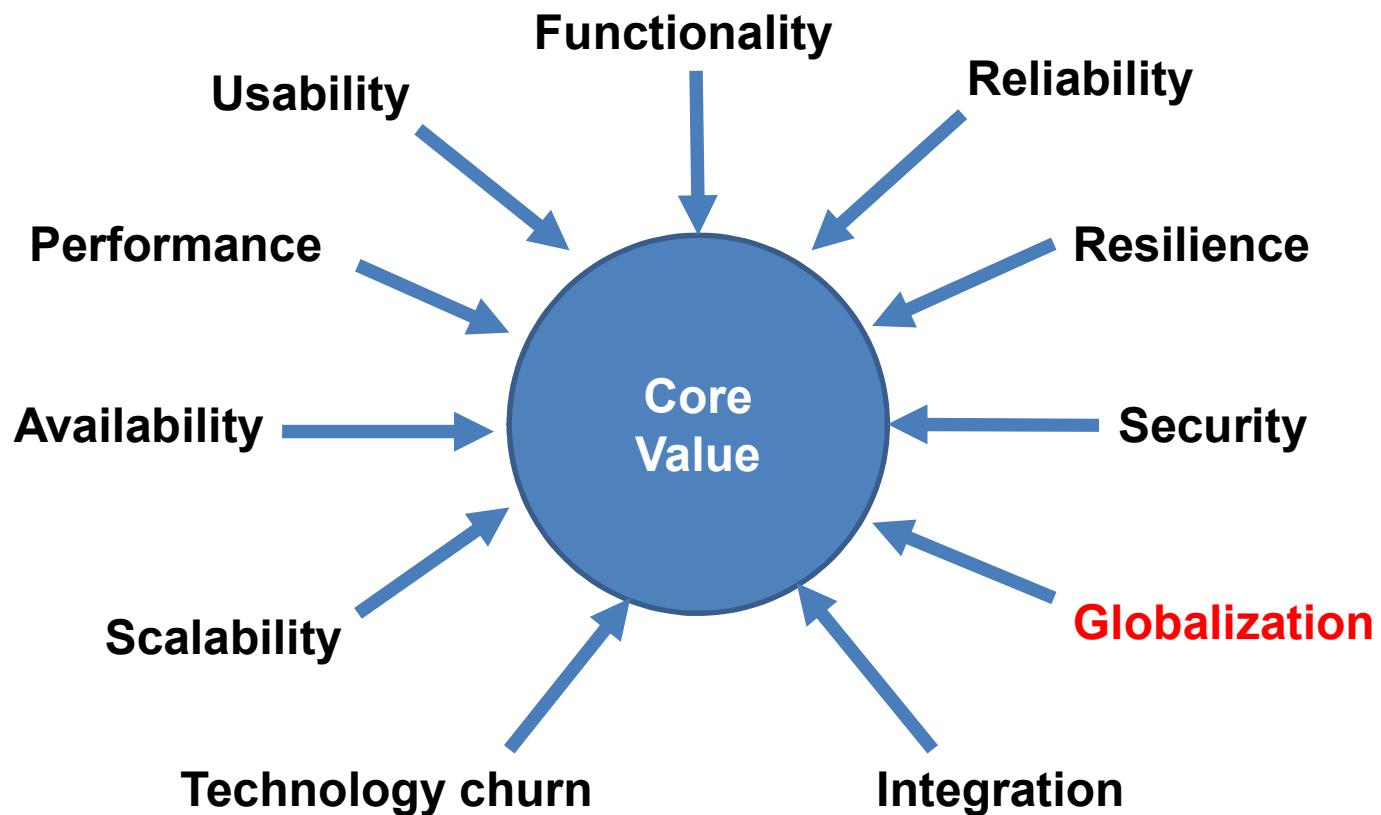
5. GLOBALIZATION & LOCALIZATION



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- Introduction
- Design for Globalization & Localization



- Increasing market
 - Distribute software to everywhere
 - Integrate multi-national produced components into a system
 - Access web from everywhere
- Support multinational enterprises
- Support international data exchange

Create a single binary

- Meet international users needs
- Reduce development effort and cost
- Ease support and maintenance pain
- Simultaneously ship or add pluggable language packs

- Single binary
- Extensible localizability
- Bi-directional language
- Easy to translation
- Customizing features
- Locale-aware feature's behavior
- Testability

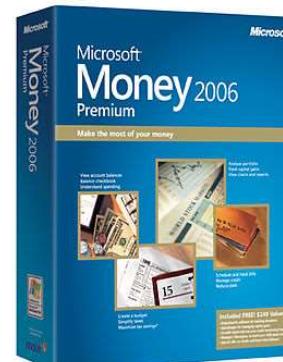
Enter and display text in different languages



Select a User Interface(UI) language



Define formatting for date, time, numbers,



Solutions for their local needs



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Market Specific

Features are added that are specific to a given culture

Localized

The User Interface is translated

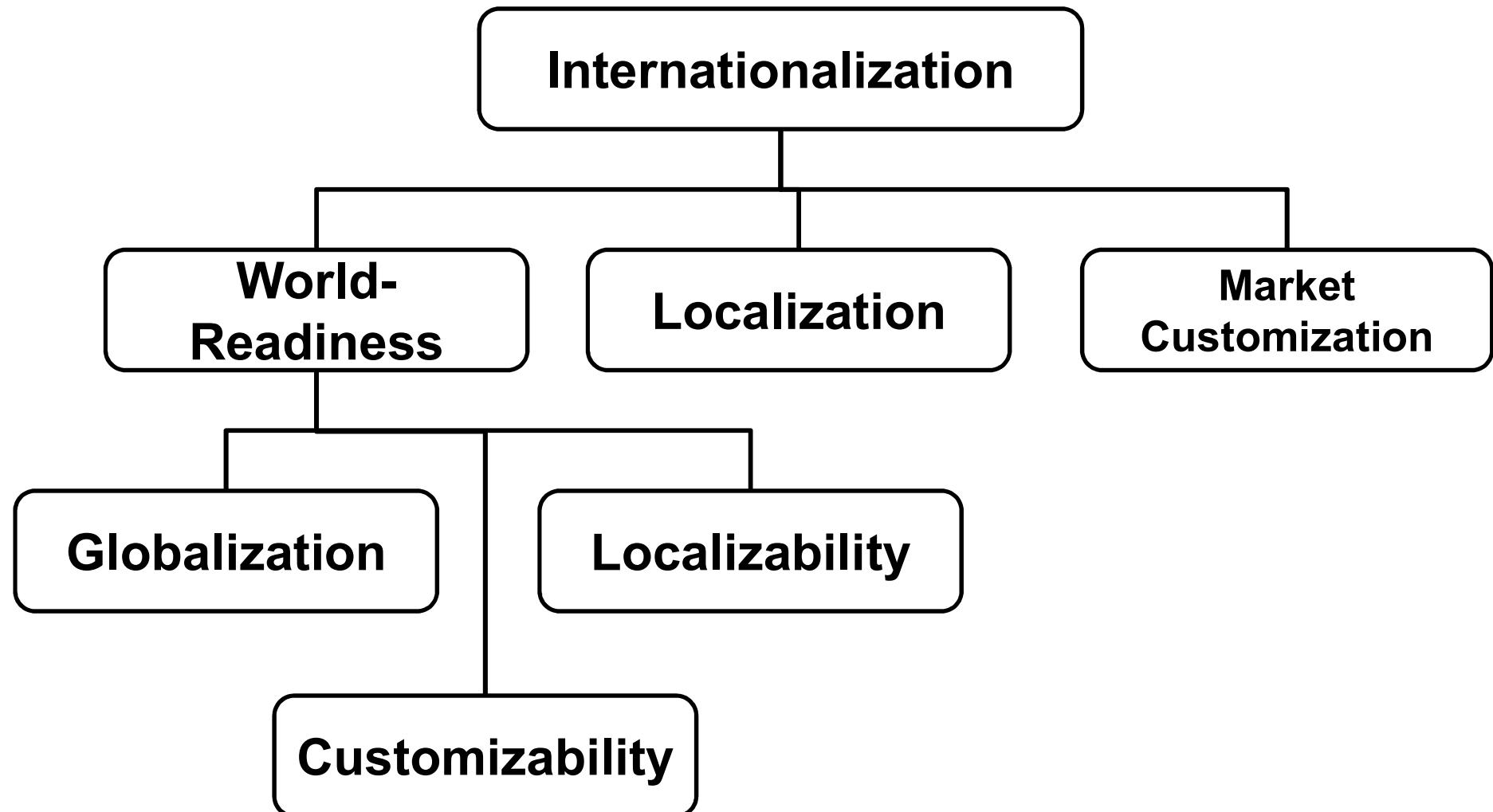
World Ready

Text and data are stored in a culture-neutral format



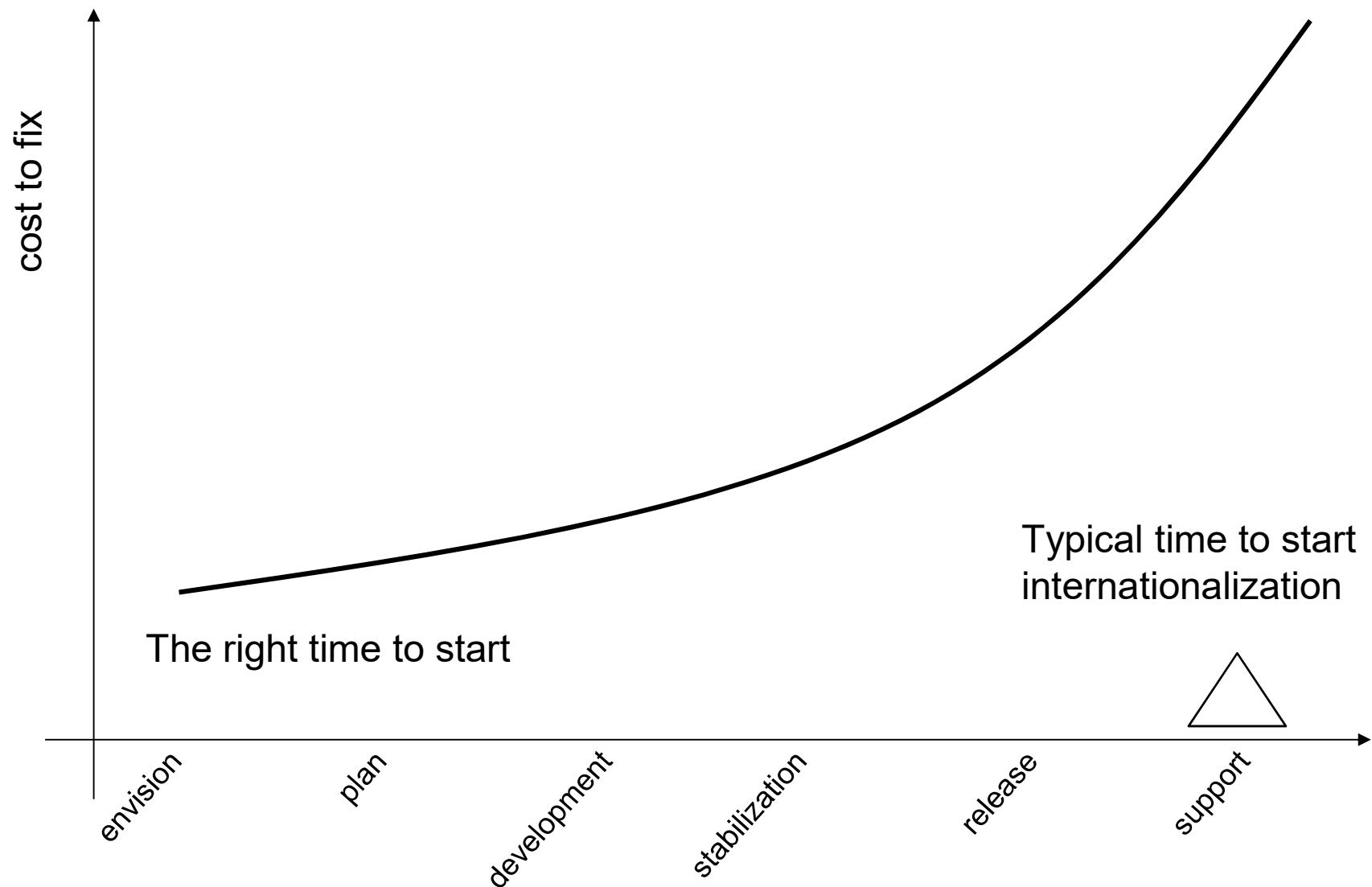
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When to Start

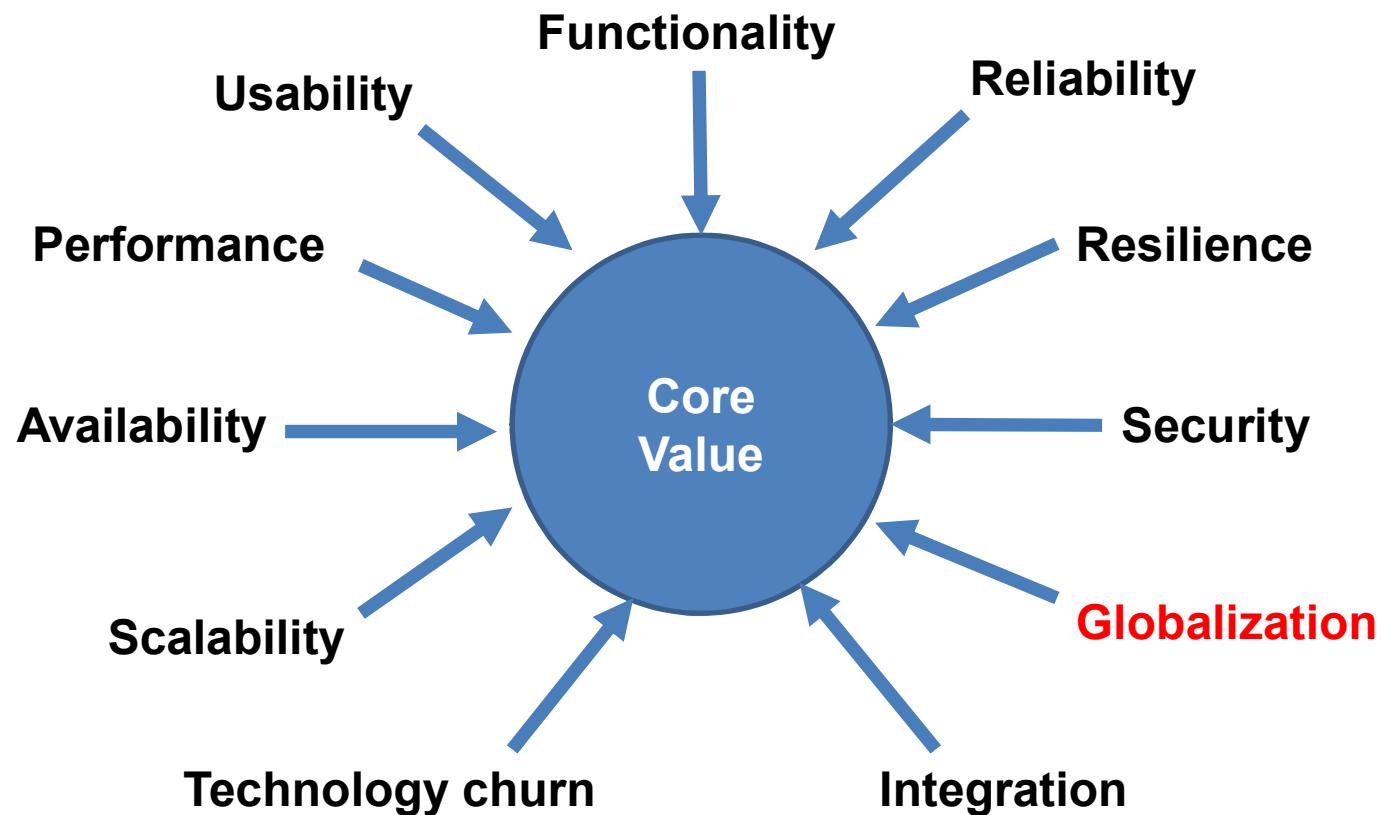
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- Introduction
- Design for Globalization & Localization



- Use **Unicode**
- Locale and Cultural Awareness
 - Scope: OS, User Preference, Application Level
 - Text, Date, Time, Calendar, Number, Currency, Address, Paper size, telephone, metrics
- Handle Input and Output capability
- Multilingual User Interface (MUI)



User Interface Layer

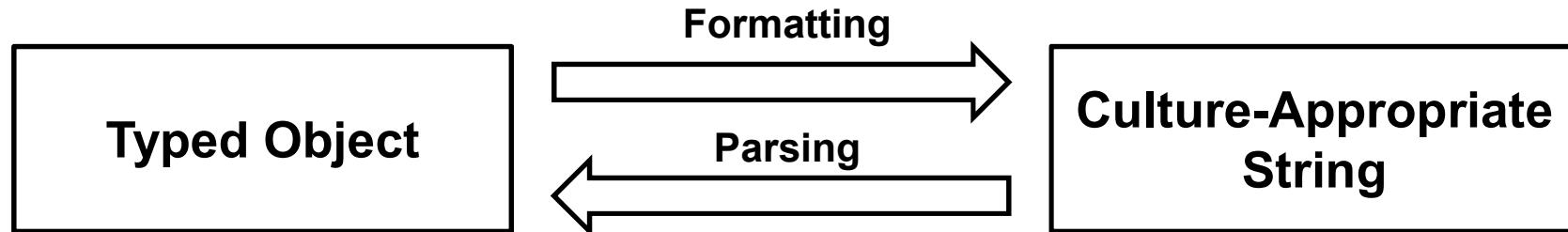
1. Parse and display data in format the user expects
2. Respect user preferences wherever possible

Business Logic / Data Layer

1. Store and transmit the data in culture-invariant format
2. Store as binary data where possible
3. Store additional meta information where necessary

Culture	Format	Result
en-US	N	123,456.78
Fr-FR	N	123 456,78
de-DE	N	1.23.456 78
"" (invariant)	R	123456.78

- Store as binary data type if possible
 - Integer, decimal, floating-point
- Invariant storage as text
 - Format using `Cultureinfo.InvariantCulture`
 - Use standard format character “`R`” (reversible) for floating point numbers



- **Formatting**
 - Standard formatting characters
 - Custom formatting characters
- **Parsing**
 - Configurable with styles
 - **TryParse** – no conversion exceptions
 - **ParseExact** for date/time values
 - **DateTime** Style



Support Non-Arabic Numerals

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<u>Arabic-Indic</u>	٤٣٢١	1234
Ideographic (表意)	二八	75
Number symbols	¼	0.25
...		

- Not supported by regular formatting and parsing yet
 - `CharUnicodeInfo.GetNumericValue`

蘇州碼子

0 1 2 3 4 5 6 7 8 9
〇 一 二 三 × 〇 一 二 三 九
| Ⅳ Ⅲ



Beware of What are Supported & Not Supported?

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- **API supported**

- Numeric formats
- Currencies
- Measurement systems
- Date/Time formats
- Time Zones (limited)
- Calendars
- Character encoding
- Capitalization
- Collation (Sorting)
- Word breaking (limited)
- Character output/fonts
- Character input/keyboard layouts
- Bi-Directional layout
- Multi-lingual UI

- **not API supported**

- Paper sizes
- Address formats
- Phone number formats
- Measurement conversion
- Exchange rates
- Texation (稅制)
- Compliance with local laws
- Business conventions



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- Separate localizable & non-localizable resources
- Should not hard code locale-related data
 - Use resources repository
 - Use API
- Be careful of string buffer capability
- Be careful of UI layout
- Support for testability
- Support for add localized features

- Localize or translate all contents
 - Color, text, image, flash, voice, video.
- Be careful of the following constraints:
 - Cultural, gender, political, religious, ethnic
- Do not overlap text on image by programming



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Localization Cycle

- Task
 - Adapt the product's language and culture for a given market
- Key players
 - Localization PM, localization engineers, localizers
- Exit criteria
 - Localized beta build or release candidate

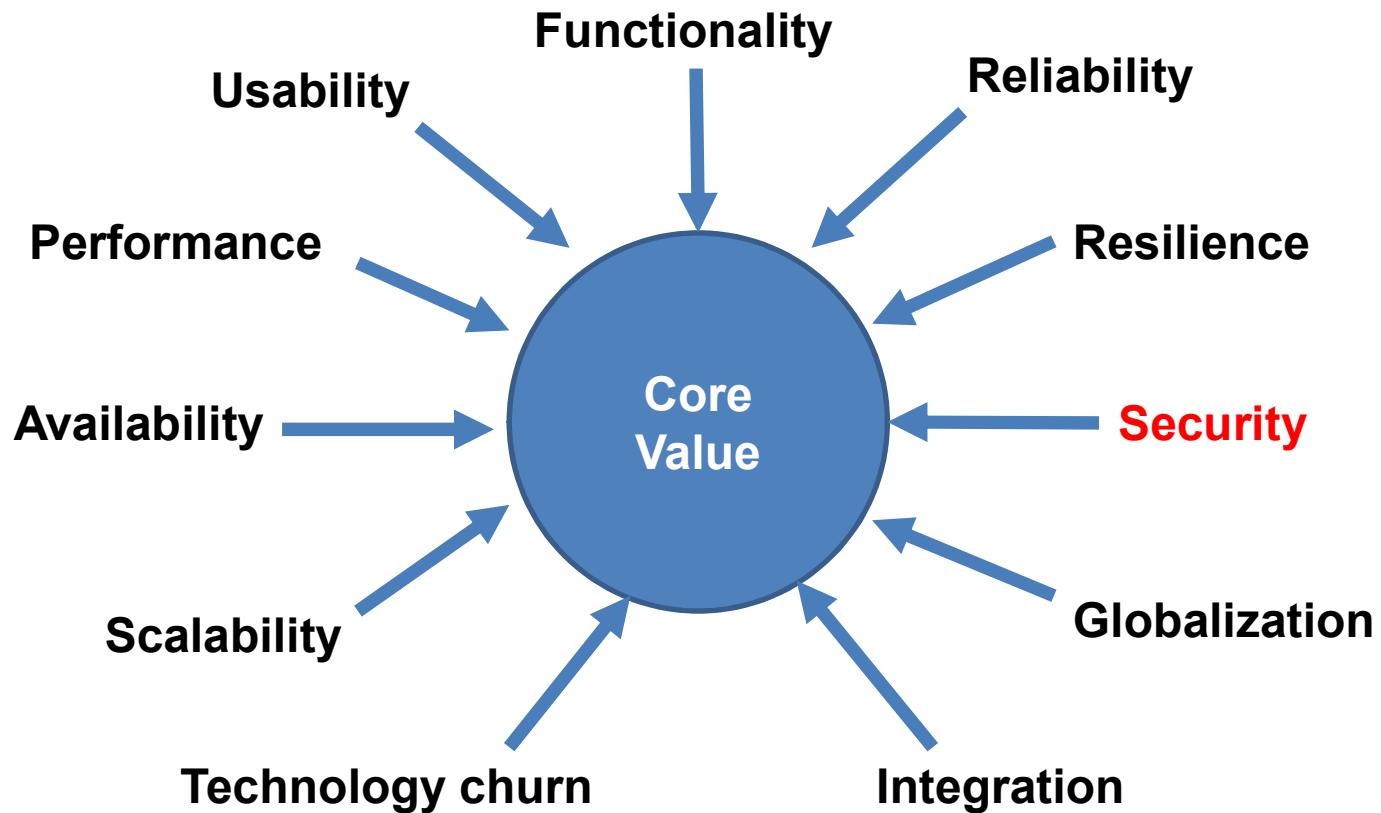
6. DESIGN FOR SECURITY

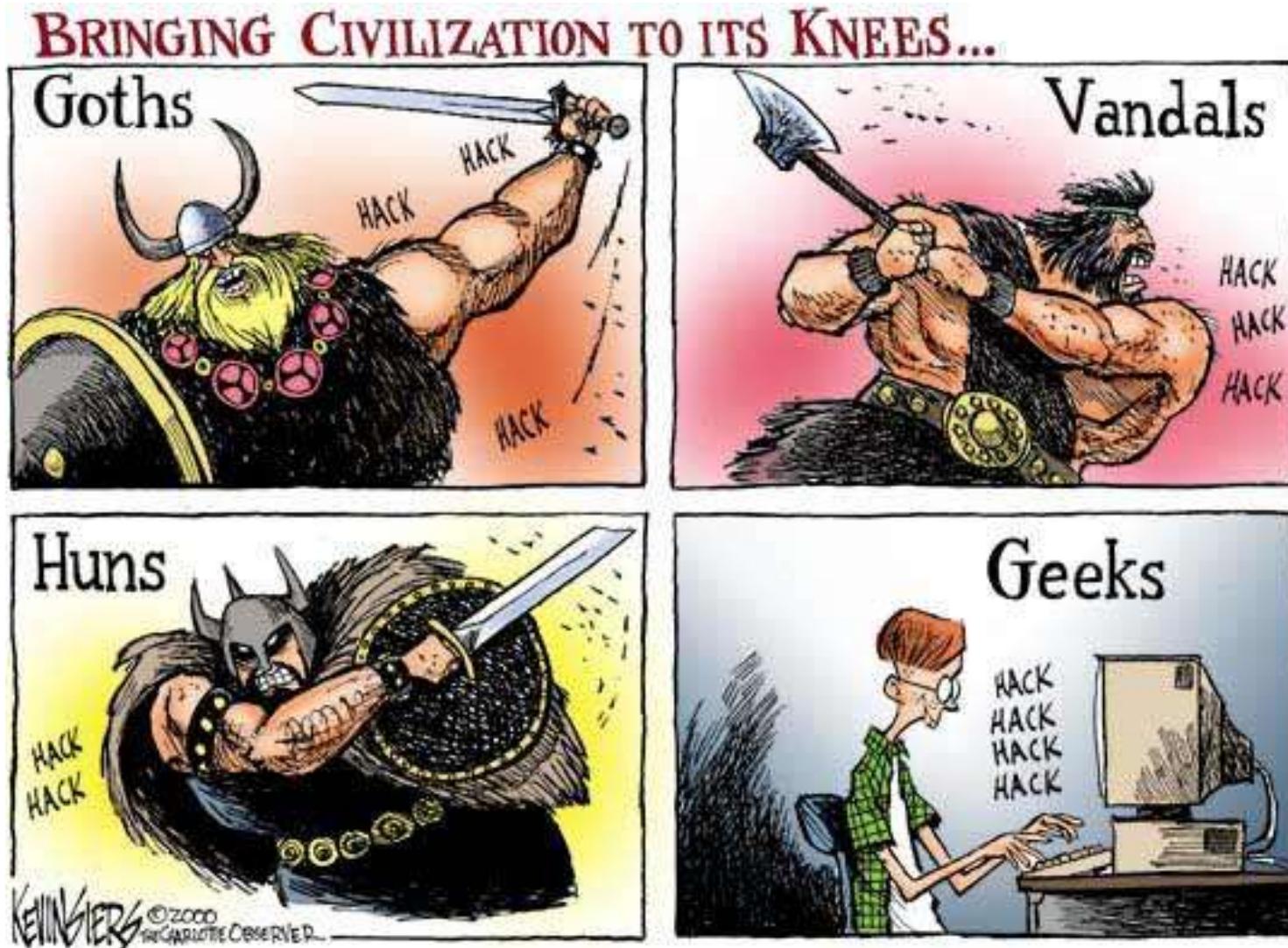


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- 資安議題與因應方法
- 弱點與對策





<http://beerpla.net/2007/07/24/bringing-civilization-to-its-knees/>



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- Find vulnerable sites using Google
- Example search queries:
 - “**filetype:mdb inurl:admin**” – 180 results
 - “**filetype:xls inurl:admin**” – 14,100 results
 - “**ORA-00921: unexpected end of SQL command**” – 3,470 results
 - “**allintitle:Netscape Enterprise Server Home Page**” – 431 results

- **Google Hacking for Penetration Testers**
https://www.blackhat.com/presentations/bh-europe-05/BH_EU_05-Long.pdf



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- Took 1 hour of coding
- 500 vulnerable sites were found in 1 minute and 26 seconds

The screenshot shows a Windows application window titled "Exploit Hunter". The interface has a menu bar with "File", "Edit", "View", "Tools", "Help", and a toolbar with icons for "New", "Open", "Save", "Print", "Exit", "Copy", "Paste", "Find", "Replace", and "Select All". Below the toolbar is a menu bar with "Results", "Exploit Modules", "Log", and "Settings". A search bar is located at the top right. The main area is a table with two columns: "URL" and "Description". The "URL" column contains numerous entries, many of which are redacted with black bars. The "Description" column shows that most of the identified sites are "SQL Server Identified".

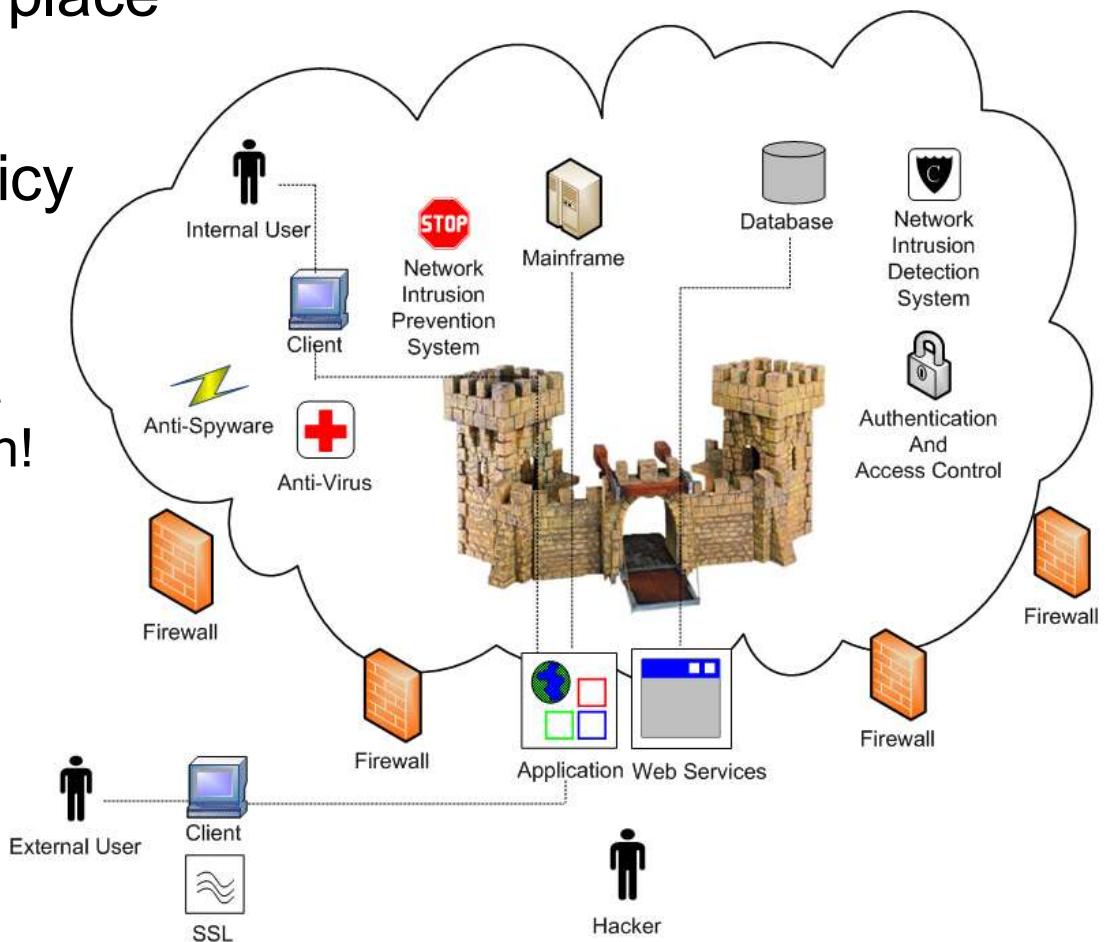
URL	Description
...:80/article.asp?id='	SQL Server Identified
...:80/article.asp?id='	SQL Server Identified
...:80/index_asmt.asp?id=&acode='	SQL Server Identified
.../catalog/Ccatalogue.asp?id='	SQL Server Identified
.../catalog/Ncatalogue.asp?id='	SQL Server Identified
...:80/kb.asp?id='	SQL Server Identified
...:80/content.asp?ID='	SQL Server Identified
...:80/ms-basics.asp?id='	SQL Server Identified
...:80/CaseStudies.asp?ID='	Microsoft Access Database Identified
...:80/faq/faq.asp?ID='	SQL Server Identified
...:80/faq/faq.asp?ID='	SQL Server Identified
...:80/asp/in_focus.asp?id='	SQL Server Identified
...:80/Articles/ReadArticle.asp?ID='	SQL Server Identified
...:80/Articles/ReadArticle.asp?ID='	SQL Server Identified
...:80/asp/release.asp?id='	SQL Server Identified
...:80/integrationNews.asp?ID='	Microsoft Access Database Identified
...:80/script/script.asp?id='	SQL Server Identified
...:80/doc.asp?ID='	SQL Server Identified
...:80/recon/index.asp?ID='	SQL Server Identified
...:80/reviews/Abstract.asp?ID='	SQL Server Identified
...:80/storyfull.asp?id='	SQL Server Identified
...:80/template/listing.asp?id='	SQL Server Identified
...:80/asp/cursos2.asp?id='	SQL Server Identified

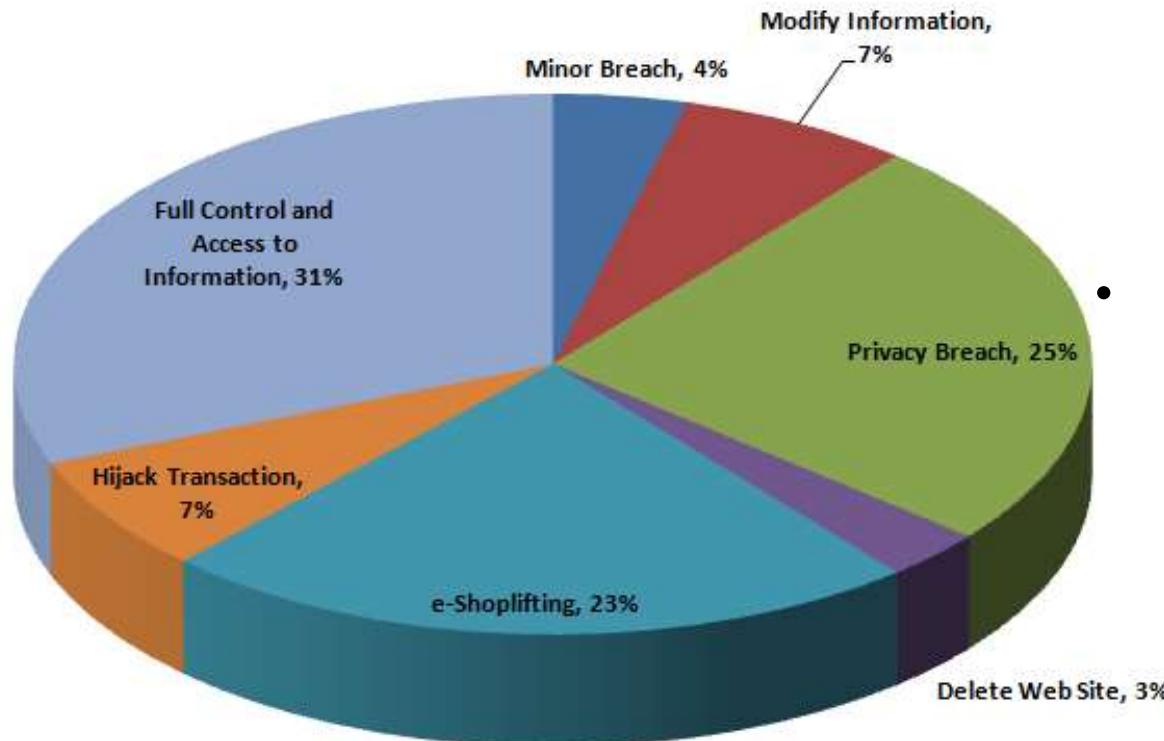


We are safe?

- We have firewalls in place
- We encrypt our data
- We have privacy policy

User (potential hackers) must have access to the application!





167 Audits conducted – 98% vulnerable:
all had firewalls and encryption solutions
in place...

- **Frequent**

- 3 out of 4 business websites are vulnerable to attack (Gartner)

- **Pervasive**

- 75% of hacks occur at the application level (Gartner)
- 92% vulnerabilities are at the application level (NIST)

- **Dangerous**

- When exploited, security defects destroy company value and customer trust



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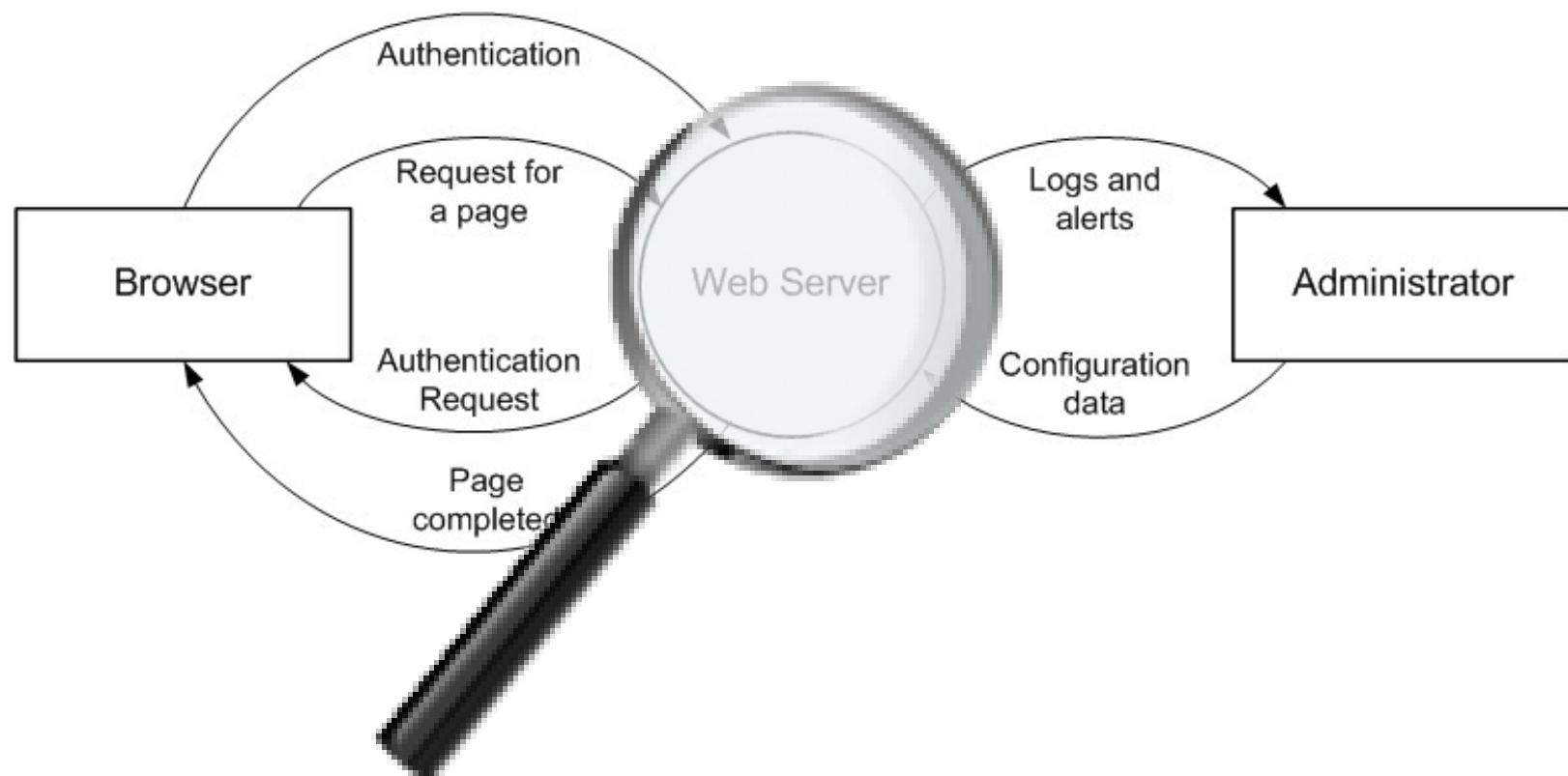
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- You cannot build secure applications unless you understand **threats**
- Find **issues** before the code is created
- Approx **50%** of issues come from **threat models**

- Create the model of app (DFD, UML, etc)
 - Build a list of assets that require protection
- Categorize threats to each attack target node with **STRIDE**
 - Spoofing(假冒識別身分), Tampering(竄改資料), Repudiation(否認), Info Disclosure(資訊洩露), Denial of Service(阻絕服務), Elevation of Privilege(提升權限)
- Build threat tree for each threat
- Rank threats by risk
 - Risk = Likelihood x Impact

Examine Flow to Find Threats

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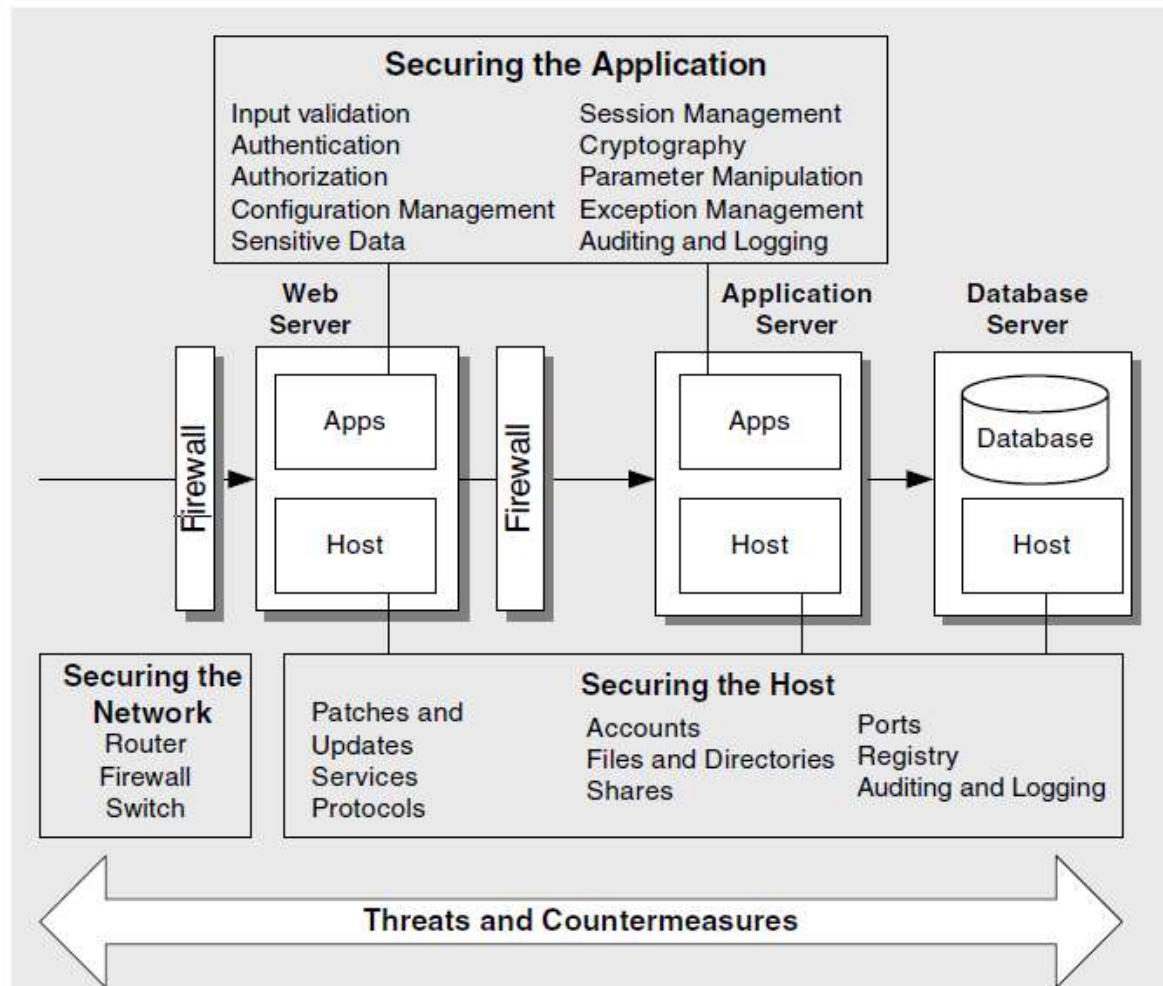


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1. Arrange for a brainstorming meeting
2. List all the possible threats
3. Apply the STRIDE security categories
4. Create notes
5. Research
6. Rank the risk of each threat

- Overall System View



From: [Improving Web Application Security \(Microsoft\)](#)

- Threat types have mitigation techniques

- **Spoofing**

- Authentication (authn) → **NTLM**
 - Good credential storage → **X.509 certs**

- **Tampering**

- Authorization (authz), MAC, signing → **PGP keys**

- **Repudiation**

- Authn, Authz, signning, logging, trusted third party → **Basic**

- **Info Disclosure**

- Authz, encryption → **Digest**

- **Denial of Service**

- Filtering, Authn, Authz → **Kerberos**

- **Elevation of Privilege**

- Don't turn with elevated privs → **SSL/TLS**



1. A1-Injection
2. A2-Broken Authentication and Session Management
3. A3-Cross-Site Scripting (XSS)
4. A4-Insecure Direct Object References
5. A5-Security Misconfiguration
6. A6-Sensitive Data Exposure
7. A7-Missing Function Level Access Control
8. A8-Cross-Site Request Forgery (CSRF)
9. A9-Using Components with Known Vulnerabilities
10. A10-Unvalidated Redirects and Forwards

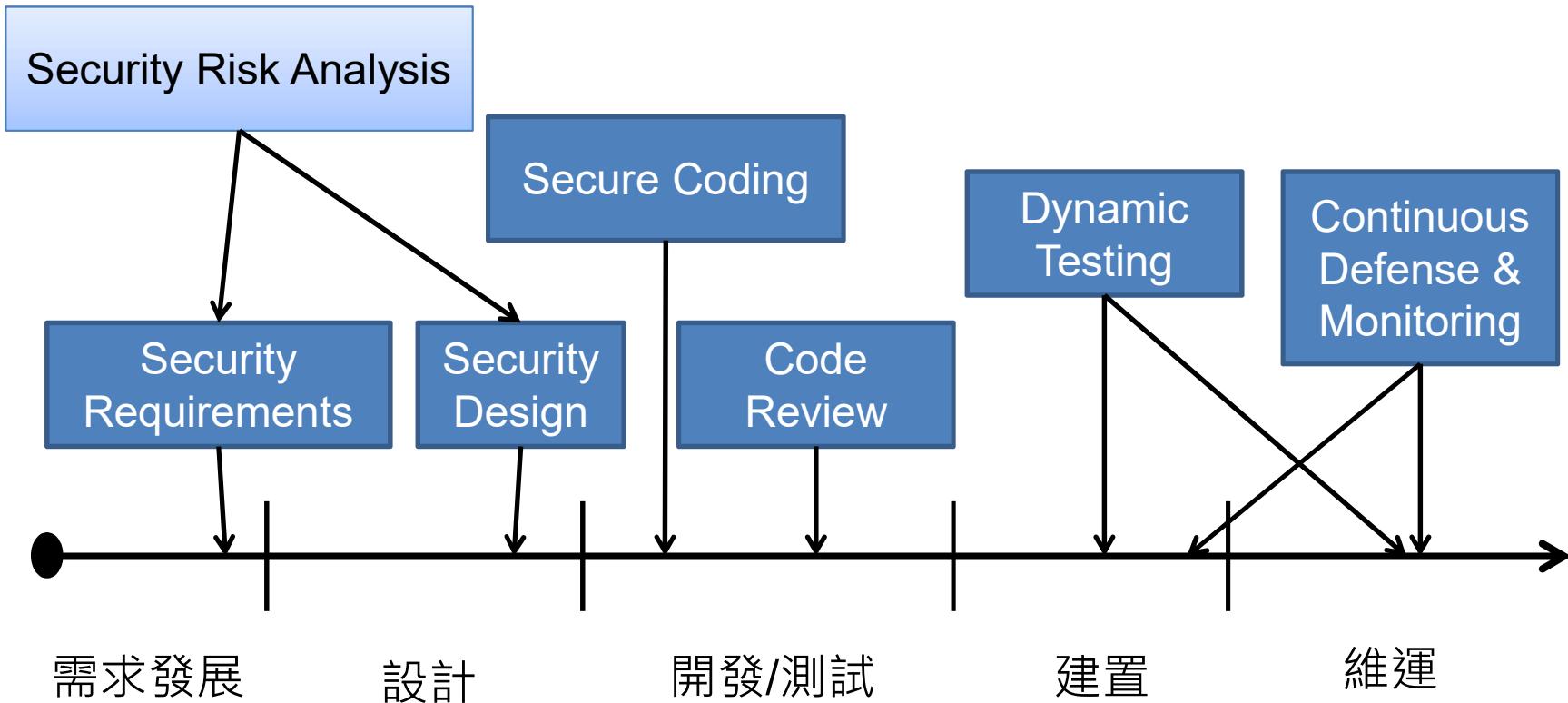
- https://www.owasp.org/index.php/Top_10_2013-Top_10
- https://www.owasp.org/index.php/OWASP_Top_10#tab=OWASP_Top_10_for_2013



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- Each threat in the model must have a test plan
- The threat model helps drive testing concepts
- Allows for White-hat and Black-hat testing
 - Testers should prove the mitigation works
 - Testers should prove they don't work



- Evaluation Risk
- Get security requirements spec in
- Allocate resources
 - Study security technology, build team capability
 - Outsourcing

7. APPLICATION INTEGRATION AND BUSINESS PROCESS INTEGRATION



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- 系統整合
- 商業流程整合



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- 資料整合
- API層次的溝通
- 應用系統整合平台
- 以標準為基礎的應用系統整合架構
 - SOA
 - Biz processing integration
 - Composite Application
 - Use existed services, either internal or external services



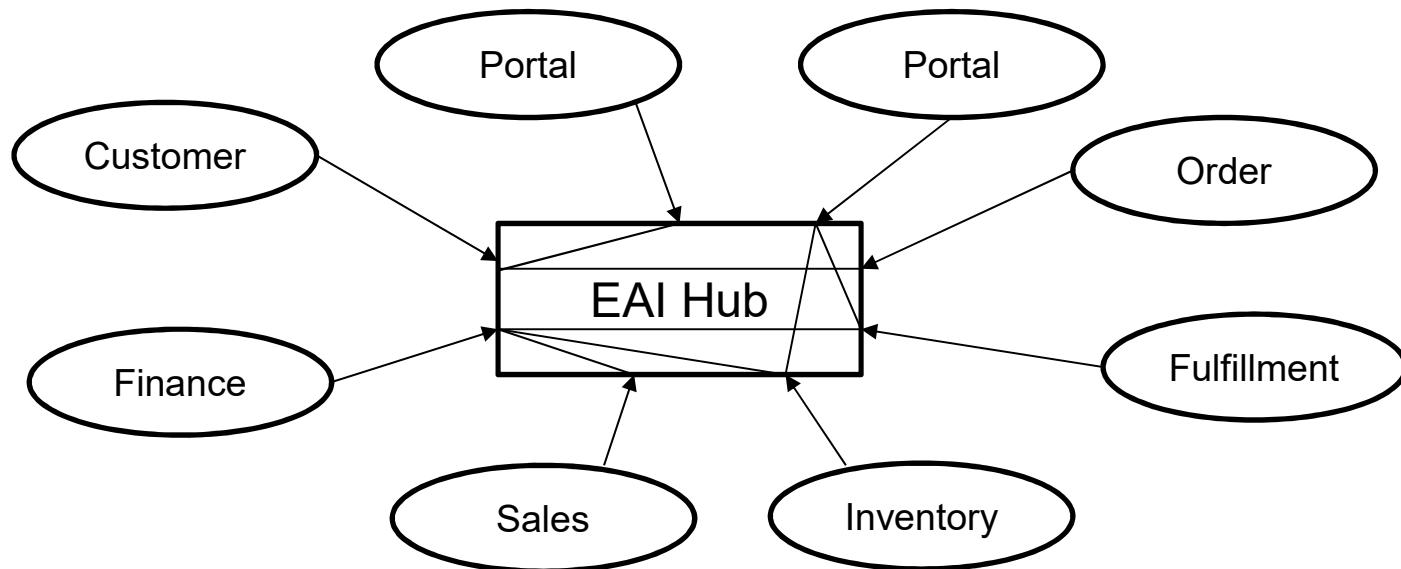
- 掌握全公司的資料庫，可以整合所有的應用程式？
- 現實是
 - 部分AP是外購的
 - 部分AP是外包的(不一定確保資料庫設計)
 - 部分AP是自己作(不一定確保資料庫設計)
- 缺點
 - 無法reuse程式與商業邏輯



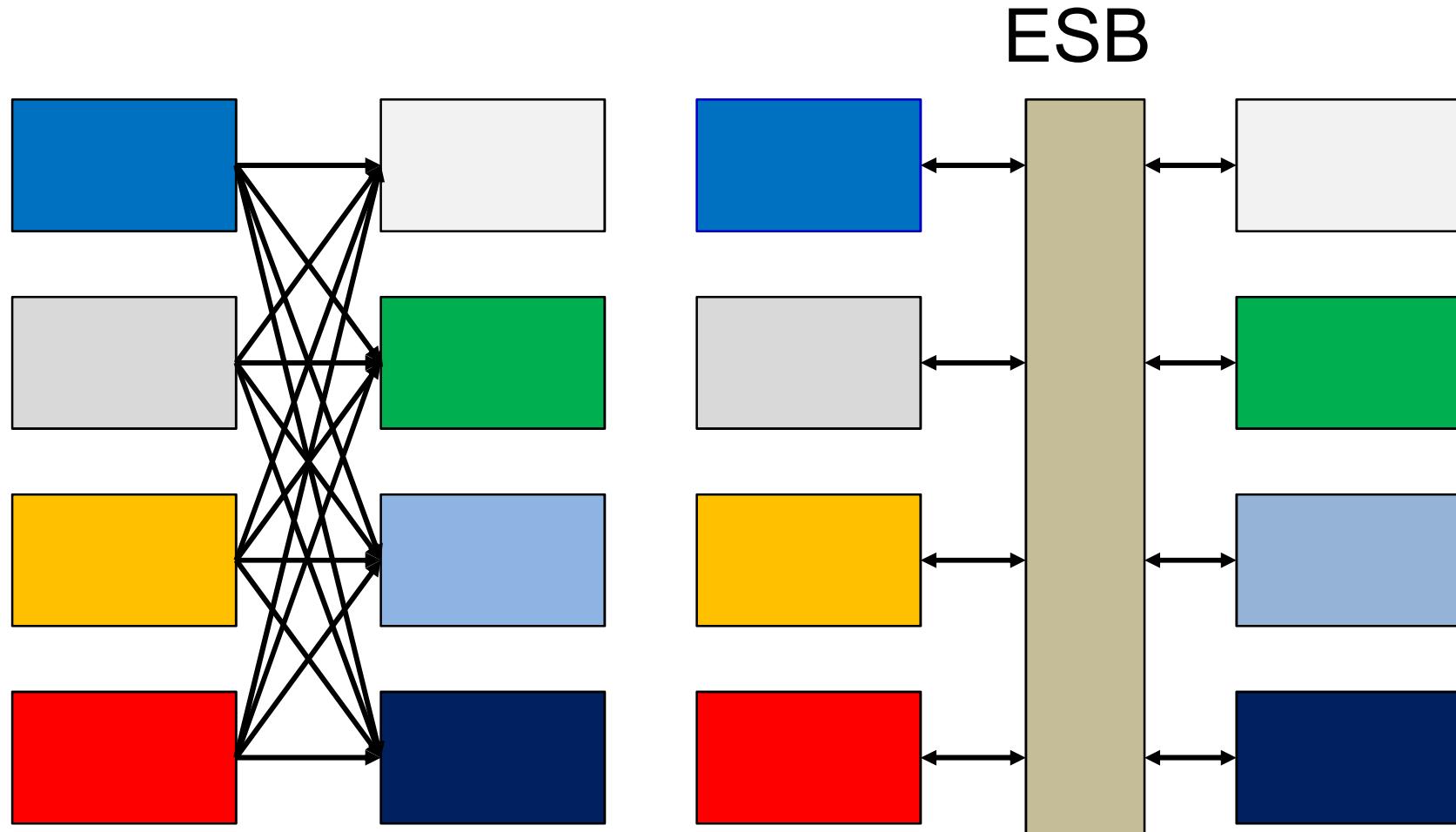
- RPC
- CORBA
- JAVA RMI
- Microsoft DCOM
- ...
- Low level & not communicate well
- 業界從來就沒有共識，直到HTTP、Web Services, ReST



EAI – Enterprise Application Integration



- Hub & Spoke Architecture
- Proprietary
- Expensive



ESB = Enterprise Service Bus



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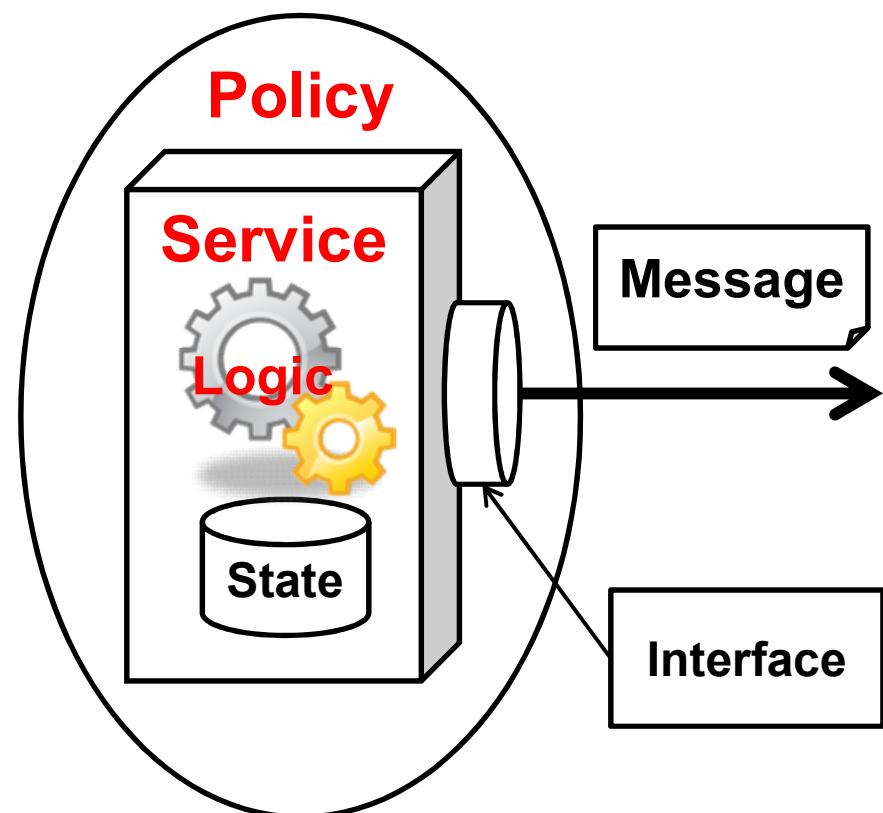
- 系統整合
- 商業流程整合



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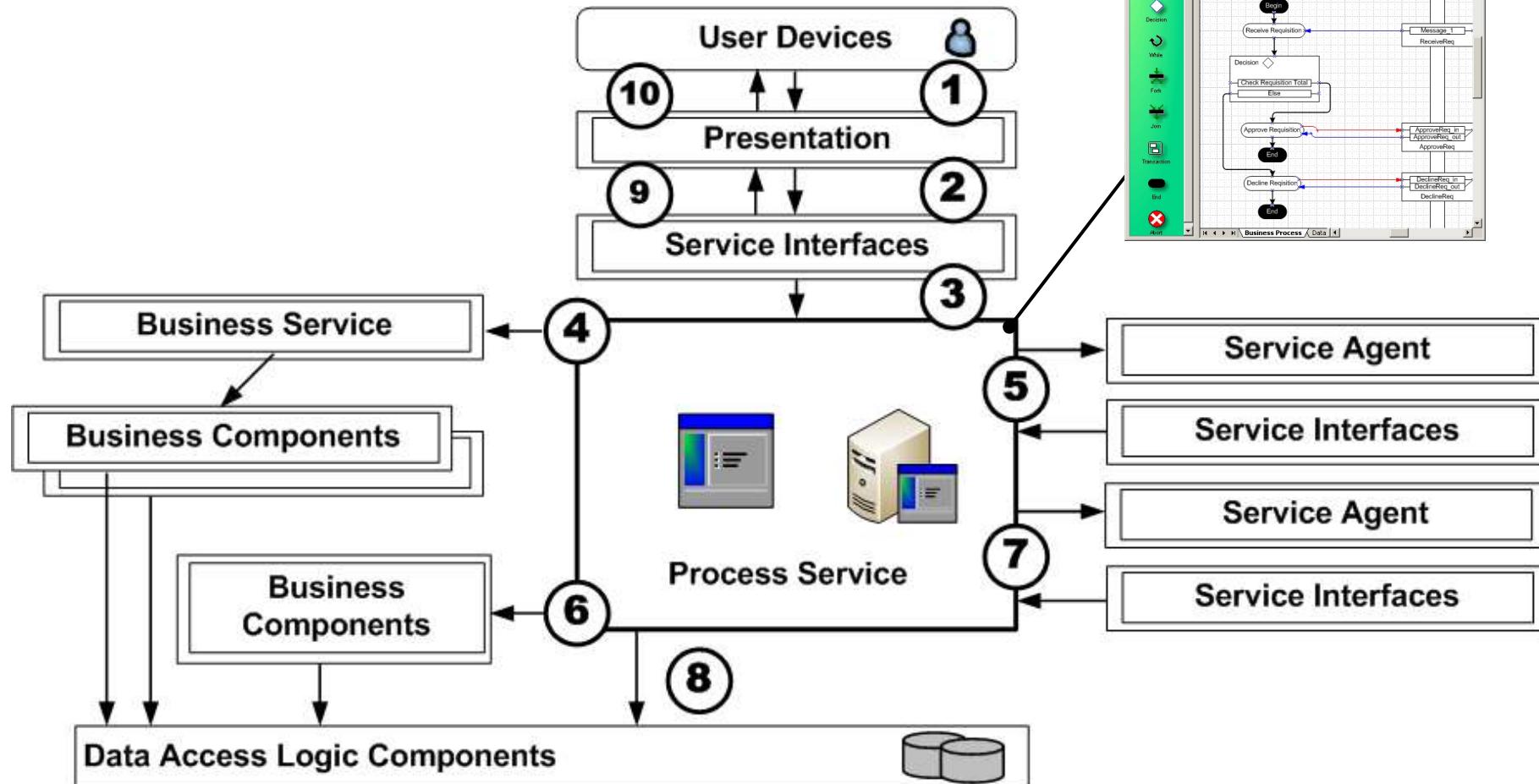
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- Unit of application logic & data
- Process request by itself
- Message-based interfaces
- Governed by policy



Architecture for Business Process Integration

- Process externalization

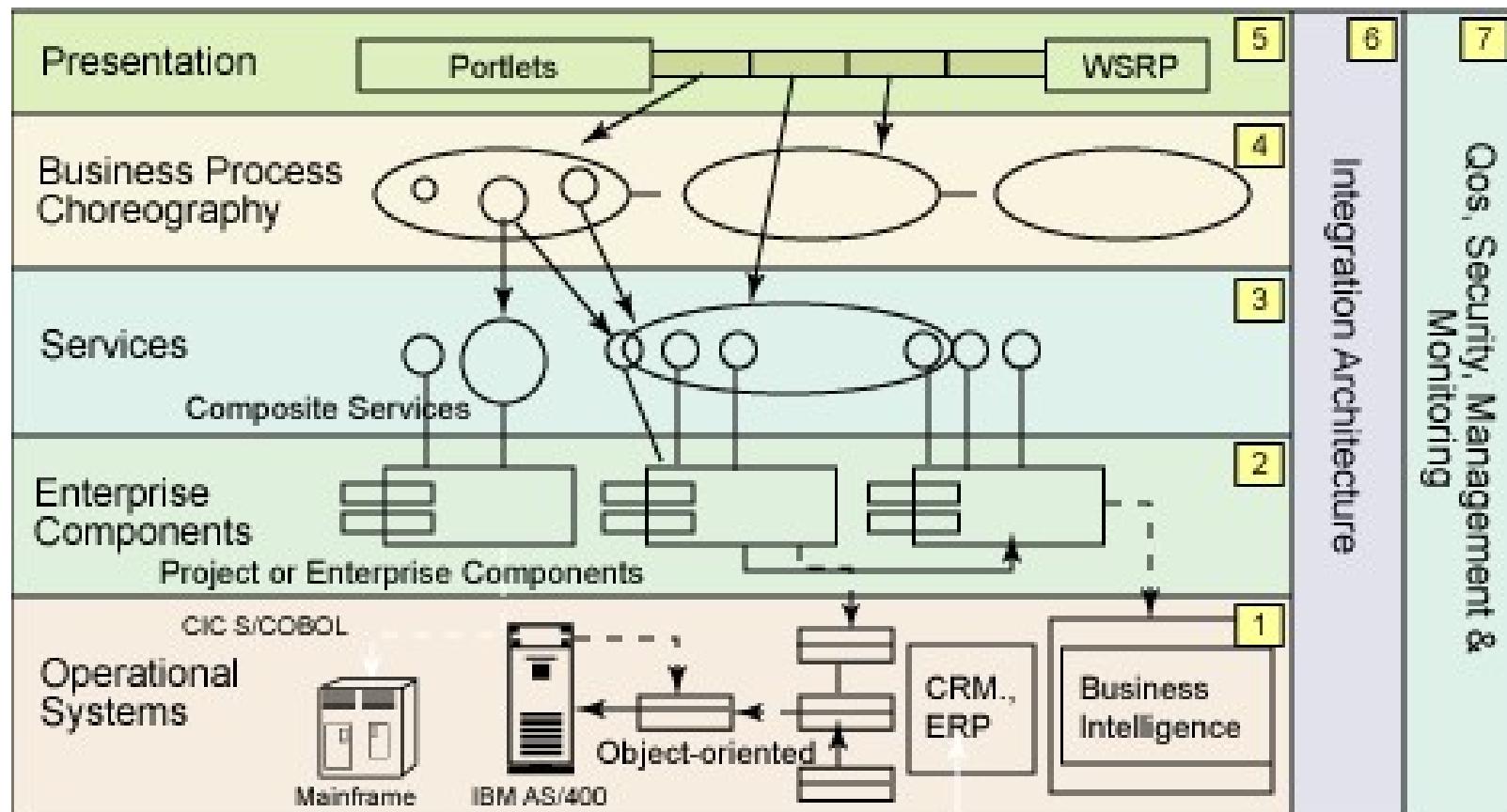


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The layers of a SOA

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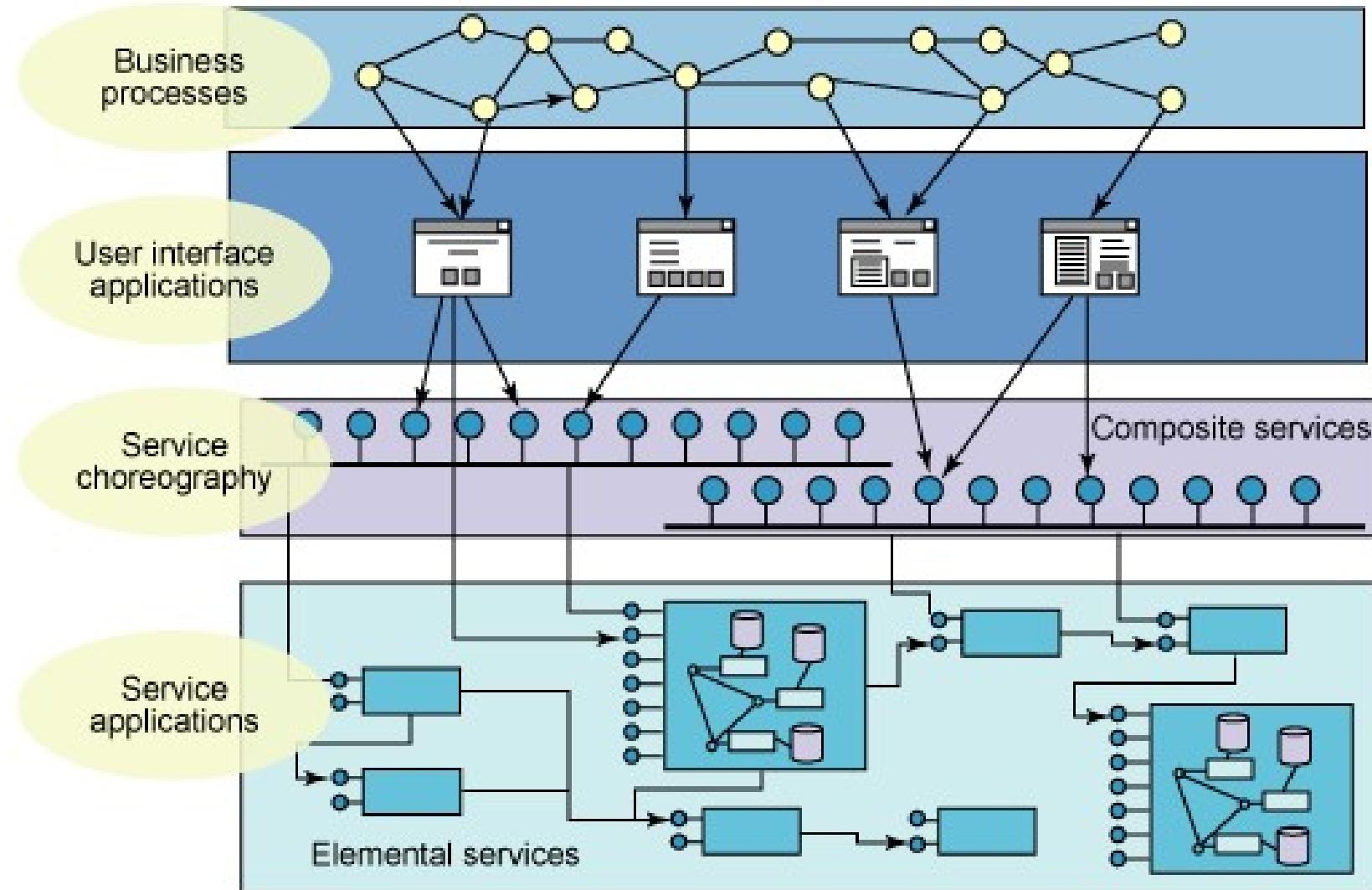
<http://www.ibm.com/developerworks/library/ws-soa-design1/>



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- SOA facilitate Biz Process Integration



- Design for Business Process Integration
 - Follow standards
 - Standardize data schema
 - Standardize APIs
 - Adopt a process integration platform

- 迎接軟體黃金時代來臨，必須掌握的關鍵技術：
 - Mobile device + Client Computing
 - Software Design & SOA
 - Cloud Computing & Parallel Programming



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簡報完畢 謝謝大家

Thanks for your participation!



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