"Do not speak unless you can improve the silence"

Chinese proverb

How To Give Strong Technical Presentations
Markus Püschel
Department of Computer Science
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Principle: Contrast

Basics
Preparation & Delivery
Content
Design

Principle: Alignment

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Presentations Are Very Important

- In contrast to a paper or other technical writing, or a simple interview, you present your work and yourself
- People remember good presentations:
  - Good content
  - Well presented
  - Well-designed slides
- You need to put effort into each presentation—it is worth it

Deficiencies?

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Deficiencies?

Presentations Are Very Important

- You present your work and yourself

- People remember good presentations

Visual quality & delivery
- The quality is the area

Technical content

Plot suggested by Jim Bain
Biological Fact I: Text Versus Images

You cannot read and listen at the same time
Ideally

You talking

Slides

Verbal channel

Visual channel

Image: http://www.illuminati-news.com/technology.htm

Handling the Medium

“Teleprompter”

Really bad

Better

Ideal

(not always possible)

“Slideument”

Presentation

Nancy Duarte, Slideology
Minimize Text

Good presentation slides are not self-contained
**Fundamental Weakness**

Presentations are temporal ... not spatial (as written documents or posters)

*accessible at present*

---

**Know Your Enemy**

+ Facebook

+ YouTube

+ NZZ Online
A few minutes boring
= The audience is gone
Preparation: Invest Time And Effort!

- **Do not prepare your talk in the last minute**
  - Not cool
  - Usually: you slacked
  - Result: “Teleprompter presentation”

- **Every presentation is important**
  - Always give your best
  - Otherwise you don’t know how to do it when it counts

You in Front of the Audience

- **Use a remote mouse (free talking)**

- **Start:**
  - Introduce yourself
  - *Acknowledge your co-authors!*
    - Say their names
    - Maybe put pictures

- **Look at the audience not the slides**
  - Focus on different people
External Material

- Everything included with copy-paste: Images, graphics, text (even if only one sentence)
- Acknowledge on the same slide!
  bottom right, gray is one option

Nervousness

Top 10 fears
1. Fear of snakes
2. Fear of public speaking
3. Fear of heights
4. Fear of closed spaces
5. Fear of spiders (and insects)
6. Fear of needles
7. Fear of mice
8. Fear of flying
9. Fear of dogs
10. Fear of thunder
11. Fear of crowds

Source: U.S.A. Gallup Poll, February 18-21, 2001 (1,016 respondents)

- Practice the presentation
- Be perfectly prepared
  Train the beginning of the talk!
- Take every small opportunity to present
Be Clear About the Goal

**Goal 1:** In these 30 minutes explain the entire approach and technology including all relevant details.

**Goal 2:** In these 30 minutes explain what main problem the technology addresses, one or two key ideas in the approach, and one or two key results. Get people excited to learn more.
A presentation is a story that starts on the first slide

Typical Organization

- Background (omit if possible)
- Results
- Motivation
- Problem statement
- Your Work
Motivation
Problem statement

What? Why? Why important?
Exceptionally clear
If possible, precise problem statement:
- Given ..., we want to compute ...
- Input: ..., Output: ....
- Block diagram showing input/output
Start interesting
- example result
- interesting fact plus source
- anything that starts the story

The Problem

Computers architectures have become more complex
- Memory hierarchies
- Vector extensions
- Multiple cores
Optimizing for software for these features is very difficult
- Compilers fail to do it
- Hence the software developer has to do it
- Requires architecture and algorithm expertise: expensive
Performance does not port
- Needs re-optimization for every new processor
- Without optimization: often 10x performance loss
Particularly noticeable for computing functions
- Matrix multiplication
- Discrete Fourier transform
- others
The Problem: Example DFT

Discrete Fourier transform (single precision) on Intel Core i7 (4 cores)
Performance [Gflop/s]

- Fastest program (1 MB)
- Direct implementation (1 KB)

- Same operations count
- Best compiler and flags
Your work

- Communicate main idea(s) and approach
- Do not (try to) communicate every detail of your work
- How to explain technical work well?

Explaining well

- Visualize
- Use examples not generic explanations
- Small example, full truth
Don’t just talk about it ....

no corners
red
\(x^2+y^2=r^2\)

... show it!

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Statistical Classification: C4.5

- C4.5 generates decision trees from training data
- The trees can be used for classification
- Formally:
  - Input: Training set of size m; each member has n features
  - Output: decision trees mapping samples to classes

Features

| $x_{1,1}$ | $x_{1,2}$ | … | $x_{1,n}$ | $C_1$ |
| $x_{2,1}$ | $x_{2,2}$ | … | $x_{2,n}$ | $C_2$ |
| … | … | … | … | … |
| $x_{m,1}$ | $x_{m,2}$ | … | $x_{m,n}$ | $C_m$ |

Classes

Samples

Example: not so good

Example: good

<table>
<thead>
<tr>
<th>Outlook</th>
<th>Temperature</th>
<th>Humidity</th>
<th>Windy</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>sunny</td>
<td>85</td>
<td>85</td>
<td>false</td>
<td>don’t play</td>
</tr>
<tr>
<td>sunny</td>
<td>80</td>
<td>90</td>
<td>true</td>
<td>play</td>
</tr>
<tr>
<td>overcast</td>
<td>83</td>
<td>78</td>
<td>false</td>
<td>don’t play</td>
</tr>
<tr>
<td>rain</td>
<td>70</td>
<td>96</td>
<td>false</td>
<td>play</td>
</tr>
<tr>
<td>rain</td>
<td>68</td>
<td>80</td>
<td>false</td>
<td>play</td>
</tr>
<tr>
<td>overcast</td>
<td>64</td>
<td>65</td>
<td>true</td>
<td>play</td>
</tr>
<tr>
<td>sunny</td>
<td>72</td>
<td>95</td>
<td>false</td>
<td>don’t play</td>
</tr>
<tr>
<td>sunny</td>
<td>75</td>
<td>80</td>
<td>true</td>
<td>play</td>
</tr>
<tr>
<td>overcast</td>
<td>72</td>
<td>70</td>
<td>true</td>
<td>play</td>
</tr>
<tr>
<td>overcast</td>
<td>81</td>
<td>75</td>
<td>false</td>
<td>play</td>
</tr>
<tr>
<td>rain</td>
<td>71</td>
<td>80</td>
<td>true</td>
<td>don’t play</td>
</tr>
</tbody>
</table>

P(play|windy=false) = 6/8
P(don’t play|windy=false) = 2/8
P(play|windy=true) = 1/2
P(don’t play|windy=false) = 1/2

H(windy=false) = 0.81
H(windy=true) = 1.0

Entropy of Features

H(windy) = 0.89
H(outlook) = 0.69
H(humidity) = …
Linear Transforms

\[
\begin{pmatrix}
y_0 \\
y_1 \\
y_{n-1}
\end{pmatrix} = y = T x
\]

\[T \cdot \]

\[
x = \begin{pmatrix}
x_0 \\
x_1 \\
x_{n-1}
\end{pmatrix}
\]

Example: \( T = \text{DFT}_n = [e^{-2k \ell \pi i / n}]_{0 \leq k, \ell < n} \)

Fast Fourier Transforms (FFTs)

- Can be expressed as structured matrix factorizations
  \[ \text{DFT}_{mn} = (\text{DFT}_m \otimes I_n) T_{mn}^{mn} (I_m \otimes \text{DFT}_n) L_{mn} \]

- Formalism:
  \( L_{mn} \quad in + j \mapsto jm + i, \quad 0 \leq i < n, \ 0 \leq j < m \)
  \( I_n \quad n \times n \) identity matrix
  \( A \otimes B \quad [a_{k,\ell}B]_{0 \leq k, \ell < n}, \quad A = [a_{k,\ell}] \)
  \( T_{mn} \quad \) a diagonal matrix
Fast Fourier Transform: Size 4

\[ \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & i & -1 & -i \\ 1 & -1 & 1 & i \\ 1 & -i & -1 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & i \\ 1 & 1 & -1 & i \\ 1 & 1 & -1 & -i \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & -1 & 1 \\ 1 & -1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix} \]

12 adds, 4 mults

**Matrix formalism:**

\[ \text{DFT}_4 = (\text{DFT}_2 \otimes I_2)T_2^4(I_2 \otimes \text{DFT}_2)L_2^4 \]

Other Transform Algorithm

\[ \begin{align*}
\text{DFT}_4 & \rightarrow P(2,3) (\text{DFT}_2 \otimes \iota_{2,1}) (\text{DFT}_2) \otimes \iota_{2,1} (\text{DFT}_2) \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \otimes \iota_{2,1} \ot \end{align*} \]
Most Common Mistakes

- Thinking: If one can understand it well, people will think it’s trivial
- Too many slides
- Slides too packed
The Design (The Looks)

The quality is the area

Visual quality & delivery

Technical content
Design is about efficient communication, not about making things pretty.
Do Not

- Decorate
- Clutter with logos
- Put name, date, conference name, etc.

- Slide numbers are useful
- You can add copyright/info when you give slides away

Colors: Basics

Avoid fully saturated

Choose somewhat desaturated

Hue

Saturation

Luminosity (brightness)
**Warm Colors Dominate, Cool Colors Recede**

- That's why in text *red* works better than *blue*
- And for boxes it is the other way round
  - Hurts a bit, no?

- For areas: try desaturated bright (= pastel) colors
- But also dark colors (again, desaturated) can be useful

---

**Design principles**

- *Alignment*
- *Layering*
Alignment

- Everything is aligned to something else
- If in doubt align *left*

Nervousness

**Top 10 fears**
1. Fear of snakes
2. Fear of public speaking
3. Fear of heights
4. Fear of closed spaces
5. Fear of spiders (and insects)
6. Fear of needles
7. Fear of mice
8. Fear of flying
9. Fear of dogs
10. Fear of thunder
11. Fear of crowds

**Example alignment: good**

- Practice the presentation
- Be perfectly prepared
- Take every small opportunity to present
- If it’s really bad
  - Try some tricks from books
  - See a specialist

Source: U.S.A. Gallup Poll, February 18-21, 2001 (1,016 respondents)
Layering

Hierarchical organization of elements through proper use of contrast, emphasis, and de-emphasis

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Boxes

Bad:
• Arrow does not touch
• Arrow not aligned
• Text in box not aligned
• Frame activates negative space! → Visual noise

Good (from the top):
• Box filled (layering), no frame
• Thin frame in slightly darker color (better contrast to background)
• Best: Arrows de-emphasized (layering)
• Best: Box inverted (contrast)

P6 Memory System

External system bus (e.g. PCI)

External system bus (e.g. PCI)

External system bus (e.g. PCI)

External system bus (e.g. PCI)
P6 Memory System

- DRAM
- External system bus (e.g. PCI)
- L2 cache
- Instruction fetch unit
- L1 I-cache
- Instruction TLB
- Data TLB
- L1 D-cache
- Instruction bus

Example good
Presenting a Viewgraph: Example

- Start like this:
  - We compare the performance of Spiral and IPP
  - The x-axis shows …., the y-axis shows
  - This means higher is better (or vice-versa)
  - For example, this datapoint means that ….

- Now you can explain more
- Then conclude
- But this plot is bad...

### Performance: Discrete Fourier transform

- **Horizontal y-label**
- **Left alignment**
- **Attractive font (sans serif, here: Gill Sans)**
- **No y-axis (superfluous)**
- **Main line emphasized (red, thicker)**
- **Background/grid inverted for better layering**
- **No legend for faster decoding**
Final words

Creating a Presentation

- Who is the audience, what do they know/think?
- What do you want to achieve?
- Come up with the storyline
- Think about good visuals (diagrams, graphs, fotos, screenshots) to support the story; then sketch the presentation on paper
How to Get Better

- Study the principles and apply them
- Give your best in every presentation
- Learn to verbalize the reason for design decisions and for problems with a slide
  - Explain and help others
  - Evaluate presentations you see
- Reduce text more and more
- Think hard about visualizations and good examples
- Experiment
- Expand your knowledge
  - Books (next slide)
  - Watch great presentations online (e.g., TED talks)

Some Books This Lecture Draws From

- Cliff Atkinson, Beyond Bullet Points, Microsoft Press, 2005
- Nancy Duarte, Slide:ology, O’Reilly, 2008
- Stephen Few, Show Me the Numbers, Analytics Press, 2004
- Garr Reynolds, Presentation Zen, New Riders, 2008
- Dan Roam, The Back of the Napkin, Portfolio, 2008
- Robin Williams, The Non-Designer’s Design & Type Books, Peachpit Press, 2008
Last Tip:
Never end with a

Thank you!

slide