Contents

- Motivation
- Related Work
- Cache Vulnerability Estimation
- Experiments
- Conclusions
What is Soft Error?

- Temporary bit flip in a semiconductor device

Soft error rate
- Is now 1 per year
- Exponentially increases with technology scaling

SER \propto N_{\text{flux}} \times CS \times \exp \left\{ - \frac{Q_{\text{critical}}}{Q_s} \right\}

Soft errors are becoming a critical design concern

D. Shivakumar et al. “Modeling the effect of technology trends on the soft error rate of combinational logic” 2002 DSN
Why Cache?

- Soft error rate in cache?
  - High due to large area

- Soft error in cache?
  - Easily propagate to CPU & lower-level memory
Contents

- Motivation
- Related Work
  - What is CVF?
  - Cache Protection Techniques
- Cache Vulnerability Estimation
- Experiments
- Conclusions
What is CVF?
Cache Protection Techniques
Contents

- Motivation
- Related Work
- Cache Vulnerability Estimation
  - CVF Estimation with Parity Protection
  - Validation through Fault Injection
- Experiments
- Conclusions
CVF Estimation with Parity Protection
Validation through Fault Injection
Contents

- Motivation
- Related Work
- Cache Vulnerability Estimation
- Experiments
  - Experimental Setup
  - When Should Parity be Checked?
  - Granularity
- Conclusions
Experimental Setup
When Should Parity be Checked?
Granularity
Contents

- Motivation
- Related Work
- Cache Vulnerability Estimation
- Experiments
- Conclusions
  - Conclusion
  - Future Work
Conclusion & Future Works
Presentation kit

- Introduction
- Electronic projection
- Assistance
- Submission
- Form considerations
  - General remarks
  - Choice of templates
  - Colors
  - Tips
- Examples
Introduction

For more tips on how best to present your paper, carefully read the "guidelines on slide preparation and presentation" on this web site.

Your written paper is available to your audience prior to your presentation. It presents your contribution in detail, including a lengthy introduction to the subject, a description of your work with proofs and detailed results, and a list of references. Many of those in the audience will have already read or glanced through your paper.

Your presentation to the audience should be less formal and less analytical and you must make every word count!
DAC will only support one means of visual aid this year consisting of the use of a video projector connected to a desktop computer with PowerPoint and Adobe Acrobat Reader.

"PDF"-files can be shown in those cases where the use of MS PowerPoint proves to be impossible. They are static presentations however (no animation), and we advise against it.

- PowerPoint recommended for the following reasons:
  - By far the most popular program
  - Good animation capabilities
  - Widely available and well equipped to convert between various formats
Submission

Information about how and when to make your files available can be found in the "guidelines on slide presentation and preparation"
Read this information carefully!
General remarks

Because presentation quality is the area which has received the most criticism from attendees, we decided to pay extra attention to it and provide you with professionally prepared templates.
Form considerations

Choice of templates

- Proven to be well suited for technical presentations
- Provide more than usual space to accommodate the often different needs of a technical presentation versus a business presentation
Form considerations

Colors

- Try to use only the 8 colors of the color scheme. They are the only ones that convert for black and white printing.
- The distinction between blues and reds for text and thin lines is especially weak.
- Red filled-in objects (circles, rectangles, etc.) with white text are well-suited for highlighting important text.
- Be aware that the contrast of your computer monitor is much higher than that of a projector in a partly lit room.
Form considerations

Tips

- Use the MS equation editor or MathType
  - Define style and size the first time
  - Use “recolor” to change from black to white
  - Copy existing equation to make another one with the same specification

- Only use clipart when it helps state your point
- Use at least 2 pt line width in drawing
- Stick with one transition effect throughout the presentation
Examples

- Animated examples show that animation is a great tool to clarify a concept or an algorithm.

- Flow controls (mouseclick or PgDn) should be added in the animations according to the pauses you need to explain a point.

- Most examples are made in Powerpoint95 except for "Binate covering problem" where each step is a different slide as required to achieve animation in version 4.
Maze run example
Line search example
Bottom-up clustering

- Clustering groups of modules and clustering groups generates a partitioning tree bottom-up

- Floorplanning can be seen as a labeling of the nodes in the partitioning tree with patterns

- What patterns to choose?
The left edge algorithm
Binate covering problem

\[ f = (\overline{y}_1 + \overline{y}_2 + y_4) (\overline{y}_1 + \overline{y}_2 + y_4) (y_2 + \overline{y}_3 + y_4) (\overline{y}_2 + y_3 + \overline{y}_4) \]

\[
\text{Cost}(y_k = 0) = 0
\]

\[
\text{Cost}(y_k = 1) = 1
\]
Binate covering problem

\[ f = y_2 y_3 + (y_1 \oplus y_4) \]

Cost\((y_k = 0) = 0\)

Cost\((y_k = 1) = 1\)
Binate covering problem

\[ f = y_2y_3 + (y_1 \oplus y_4) \]

Cost\((y_k = 0) = 0\)
Cost\((y_k = 1) = 1\)

<table>
<thead>
<tr>
<th>(y_1 \quad y_2 \quad y_3 \quad y_4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(y_1 + y_3 + y_4)</td>
</tr>
<tr>
<td>1 1 1 1</td>
</tr>
<tr>
<td>(\overline{y}_1 + y_2 + \overline{y}_4)</td>
</tr>
<tr>
<td>0 1 0</td>
</tr>
<tr>
<td>(y_2 + \overline{y}_3 + y_4)</td>
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Binate covering problem

\[ f = y_2y_3 + (y_1 \oplus y_4) \]

Cost \((y_k = 0) = 0\)

Cost \((y_k = 1) = 1\)

\[
\begin{array}{c|cccc}
  & y_1 & y_2 & y_3 & y_4 \\
\hline
 y_1 + y_3 + y_4 & 1 & 1 & 1 & \\
\bar{y}_1 + y_2 + \bar{y}_4 & 0 & 1 & 0 & \\
 y_2 + \bar{y}_3 + y_4 & 1 & 0 & 1 & \\
\bar{y}_2 + y_3 + \bar{y}_4 & 0 & 1 & 0 & \\
\end{array}
\]
Binate covering problem

\[ f = y_2 y_3 + (y_1 \oplus y_4) \]

Cost\((y_k = 0)\) = 0

Cost\((y_k = 1)\) = 1

Minimum solutions:

\[ y_1 = 1, \; y_2 = y_3 = y_4 = 0 \]

\[ y_1 = y_2 = y_3 = 0, \; y_4 = 1 \]