Evaluation of the *Software Optimization Guide for the AMD Hammer Processor*

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This evaluation starts off with general comments that apply to the entire optimization guide for the AMD processor code-named "Hammer" and then focuses on the front matter and introductory material. It closes with comments specific to the guide's appendices (an area that commonly needs work because of its grab-bag nature and its tendency not to receive the same attention as chapters).

Many additional specific comments are marked as PDF annotations within the guide itself (although note that they do not call out every instance of the general problems mentioned in this evaluation).

General Comments

The guide is generally quite well written and easy to follow. It especially does a good job of defining terms clearly before their first use. Consistent with its purpose, it focuses on making imperative statements regarding what the reader can do to optimize, rather than going off too much on other perspectives or tangents. It also seems to do a good job of cross-referencing other chapters/sections. Looking at the earlier guide on which it's based, I notice many improvements that in general make the this guide more readable, polished, and professional.

Examples

It's great that there are so many examples; they're no doubt critical in this type of guide. Along the lines of their being so important, here are some suggestions for improvement:

- I think it would be helpful to the reader (especially one returning to the guide for later reference) if the listing captions were more informative — for example, giving an idea of what the code does that is to be avoided or is preferred.

- I felt in some cases that further explanation of particular examples (in the surrounding prose) might be helpful, although perhaps your intended audience will be sharp enough to pick up this type of thing immediately on their own.

- I found the dual numbering — of both the listing and the example within it — a bit confusing and distracting, especially at first. I suggest that you not number examples (as in "Example 1") unless there's a good reason to — for example, when two listings show the "Avoid" and "Preferred" case for the same basic example — and that whenever you refer to an example, you do so by its listing number.

- A minor related point: I wouldn't include the page numbers in cross-references to listings (or tables or figures) that follow immediately. This leads me to go through the extra bother of checking the

current page number, whereas normally I'd simply read on and expect to find the listing/table there. (Similarly, in explanatory text just below a listing, the page numbers strike me as cumbersome.)

- There are some examples for which neither "Avoid" nor "Preferred" is specified but where it seems applicable, and many places where code isn't captioned as a listing at all (plus quite a few tables without captions). There's even an Example 2 (Listings 127–128) without a preceding Example 1 in the same section (although note that the edit suggested in my comment in the preceding subsection would introduce an Example 1).

I'd make a special pass over the guide to ensure that whatever conventions are decided on for examples (and tables) are rigorously followed in all cases where applicable. (My detailed comments within the PDF assume the existing captioning conventions will remain, since there wasn't time to address this issue in full and suggest a specific alternate approach.)

Style Inconsistencies

The guide does need some copyediting, to correct minor errors but mainly to make the style consistent. Below are examples of areas where the style conventions appear uncertain, or at least are unevenly applied. My PDF annotations mark some copyedits that I thought were particularly important for comprehension (or that I otherwise felt you'd want to be sure not to overlook).

- Use of third person (for example, "the programmer") vs. second (it freely uses the imperative, but only occasionally "you"). Even the formal "one" is occasionally used (for example, in sections 6.7 and 10.26).
- Prepositions capitalized inconsistently in headings. (Usually, but not always, they're capitalized if they're four or more characters long.)
- Hyphenation.
- Whether numerals are spelled out.

Incidentally, writing style guides/sheets is one of my specialties, and I'd be happy to help you with that if you like.

Other General Comments

There were a number of places where I noticed some choppiness due to overdividing a section into subsections. Later in this evaluation I note some headings that I recommend deleting; other examples include the current section 1.5.1 heading and the heading "Determination of a, m, s" in sections 8.1.2 and 8.1.3. (Speaking of section headings, I'm surprised to see that the section cross-references don't include the section number, since that's usually the main reason for having such numbers; I recommend including them.)

I also noticed a number of cases where the same guideline included in more than one section was edited in one section but not the other(s). For example, compare sections 2.1.5 and 4.2.

Table of Contents

I'd find it easier to grasp the contents/organization at a glance if the table of contents went down only two levels. (No big deal, but also along these lines I'd tighten up the vertical spacing between second-level entries — more like that used in the lists of figures and tables.)

Chapter 1

I suggest clarifying at the beginning of this chapter that it will introduce both the guide itself and some basic concepts/terms related to the subject matter.

It's great that this chapter points out the usefulness of Chapter 2, but I'd take this further (say, under "Using This Guide") and elaborate on how the rest of the guide is organized — not necessarily a chapter-by-chapter list (as in the earlier guide), which can be tedious, but whatever might be helpful to orient the reader at this point. For example, here is where you'd cover the commonality between Chapters 4–10 vs. the somewhat different, higher-level slant of Chapters 2, 3, and 11. You could also clarify that Chapter 11 isn't the sole place where 64-bit optimizations are discussed (in view of which, incidentally, I'd prefer a chapter title more like the one in the earlier guide; also, you might consider moving Chapter 11 to follow Chapter 3). In general, your approach would be to direct readers where to turn to get the information they need (as opposed to simply stating what each chapter covers).

I suggest pointing out that (consistent with your summarizing the most important optimizations up front, in Chapter 2) the guidelines are listed in order of importance in all chapters — and not repeating this again in each chapter.

I think it's best to be very clear on whether "Notes" supply supplementary or particularly important information — that is, are they called out so that they can easily be skipped by noncurious readers or because you want to be sure readers don't miss them? You say they provide "extra or helpful information"; to me, "extra" implies supplementary, and "helpful" is vague — yet the first such note I see (in Chapter 3) seems pretty important.

Appendices

In each appendix, I'd prefer some up-front guidance (as in each chapter) re the purpose of the appendix (and, as in the chapters, I wouldn't put a brief introduction under a heading like "Overview" or "Introduction"). It's pretty clear what the topic is, but perhaps you could supply some guidance re why I might want to read it in view of my interest in optimization. (Actually, this comment doesn't apply to Appendix F, whose relationship to optimization techniques is clear, but see my additional comment on that appendix below.)

Appendix A

I'd remove heading A.2 (same as the appendix heading). I think the text flows better as a continuation of the introduction to the appendix.

I'd remove heading A.4 (and work the introduction to the figure into the preceding paragraph, which in fact already refers to it). I also suggest renaming the "Superscalar Processor" section to "Overview of the Hammer Processor."

I suggest referring to this appendix in section 1.4.

Appendix D

The following seems like a clearer, more logical way to structure this appendix. (It amounts to removing one heading and changing the level of some others.)

<Remove the D.1 and D.1.1 headings (and reorganize the intro material as indicated in my comment in the PDF)>
D.2 Understanding Instruction Entries
    D.2.1 Interpreting Placeholders
    D.2.2 Interpreting Latencies
D.3 Integer Instructions
<etc.>

Appendix F

I'm not sure why this is an appendix. It seems similar to some chapters on optimization techniques. (It even refers to itself as a "chapter"; I wonder if it was one at one time.)