Technical Research

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What Research?

- You need answers to:
  - How do I use this library?
  - How do I use this software?
  - What are the electrical characteristics of this device?
  - Where do I buy this software/hardware?
  - Why am I seeing this problem and how do I get around it?
  - What else has been done that is similar to my work?

Vendor Documentation

- Your primary source of information is documentation from the vendor.

    - Direct from the source. The vendor ought to know.

    - Examples:

        - Intel's documentation for the IA-32 processor.

        - Mircochip's documentation for the PIC processor.

        - The OpenSSL web site's documentation for OpenSSL.

- Often with many irrelevant (to you) details.

    - Skim

    - BUT... don't be afraid to read things that seem off the subject now and then.

Read It!

- Read it!
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- Read it!
  - Did I mention that you should read it?
- Don't worry if you don't understand everything.
- Don't worry if you have to read it several times.
  - With each pass you'll learn a little more.
  - The more you know the easier it gets to understand

Standards

- Many systems rely or refer to standards.
    - Official ISO or ANSI standards (cost money)
    - RFCs (free download)
    - W3C "Recommendations" (free download)
    - Documents published by various industry consortiums.
- Hard to read
    - Like legal documents; precision and completeness are valued more than clarity.
    - Usually requires many passes to understand.

"Pure" Research

- In theory it is the source of all knowledge.
  - Academic institutions publish results openly.
  - Industry publishes some results but typically keeps the best things to themselves for competitive advantage.

- Research published in academic journals.
  - With enough detail to allow others to duplicate or check the results.

- Difficult reading. Not always relevant to current technology. **Basis of tomorrow's technology.**

Tutorials, Books, etc

- Summarizes and digests the information in the vendor documents or standards, etc.
    - Usually much more approachable.
    - Often a good place to start.
- BUT...
    - Can be out of date.
    - Can be wrong (does the author really know what he/she is talking about?)
    - Can leave out details that are important to you.

Forums, Mailing Lists, Etc

- Interact with an actual human.
  - You can describe your specific problem.
  - You can get answers tailored to your situation.
- Mixed results.
  - Some experts or near experts are happy to help even novices.
  - Some people think they are experts but really spout gibberish.
- Formulating good questions helps.
  - You might answer your own question on the way!

Cautions

- Don't copy things from Google mindlessly

    - Many "answers" online won't actually apply to your case… or they are just plain wrong.

- Check the date on any online information

    - It may be very old and not relevant.

- Information about similar systems/versions…

    - … **might or might not** be relevant.

Experiment!

- Experiment!
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- Experiment!
  - Did I mention that you should experiment?
- If you are unsure about how something works.
  - Try it!
  - Create a side project or test bed just to learn about something.
    - Avoids screwing up your main work if you bungle it.

Story

- Question posted on the Open Watcom user's newsgroup:

    - "What happens when I write a program that tries to use DOS interrupts directly while executing in protected mode under a DOS extender?"

- Answer:

    - "Write such a program and find out."

Summary

- Don't be afraid to seek out and read documentation.
  - Don't worry if you don't understand it all at first.
  - Don't worry about skipping around in it.
  - Expect to read material multiple times.
  - Keep at it and comprehension will come.
- Don't be afraid to experiment.
  - Test things in isolation so you don't have to worry as much about breakage.