C Programming

Problem Solving, Part 1

We've seen
some of
the mechanics
of programming

But that's not
the most
important part

Problem solving!

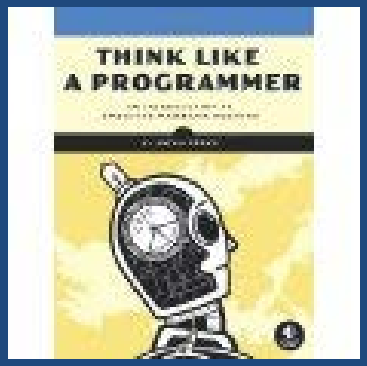
You do it every day

Techniques for Problem Solving

From "Think Like A Programmer: An Introduction to Creative Problem Solving" (TLAP)

by V. Anton Spraul

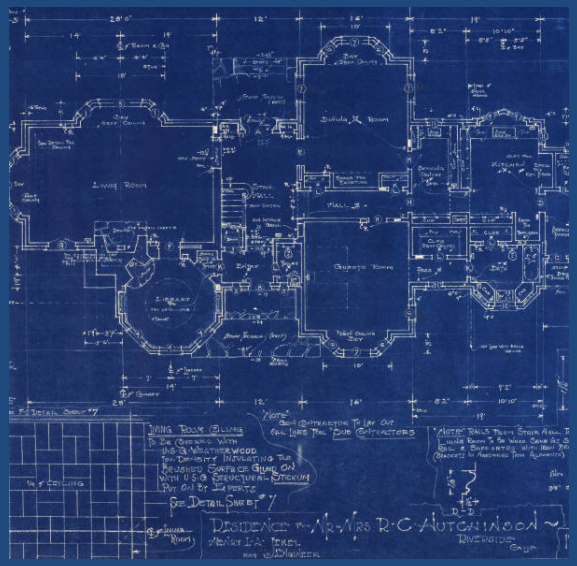
(No Starch Press)



1. Always have a plan.

If you don’t have a plan,
your only other option is:

Solve the entire problem in one shot



Instead, you can ...

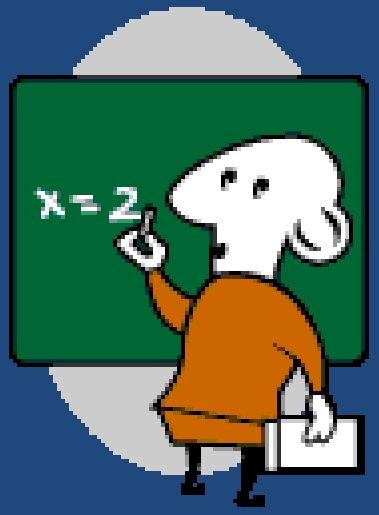
Create minor goals

Achieve minor goals

And go from there

We'll look at this when we look at Baby Steps

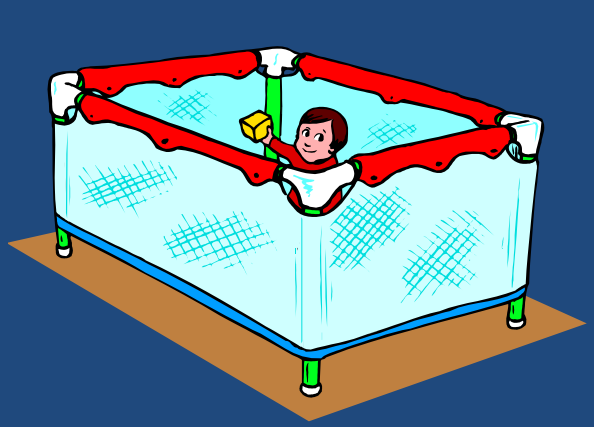
2. Restate the problem.



Example from TLAP:

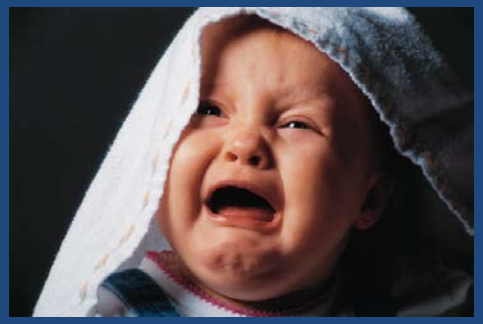
Grandmother wanted to knit without interference from baby granddaughter

Obvious Solution #1: Put baby in playpen and knit beside playpen.



Problem with Solution #1:

Baby kept crying because she didn't want to be in the playpen



Restatement of problem shows that knitting in peace was the desired goal

3. Divide the problem.

If you can split a task into multiple tasks

the combined effort
of all
is usually far less
than
doing it all at once

Divide up a task
into other tasks that
you can solve easier

We saw
a form of this
with
pseudocode

4. Start with what you know

This combines with the previous point

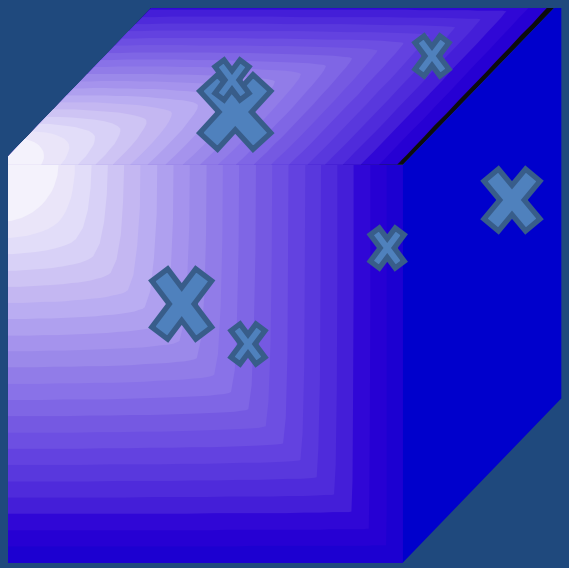
Do what you know
how to do
so
you can figure out
what you don't know
how to do

5. Reduce the problem.

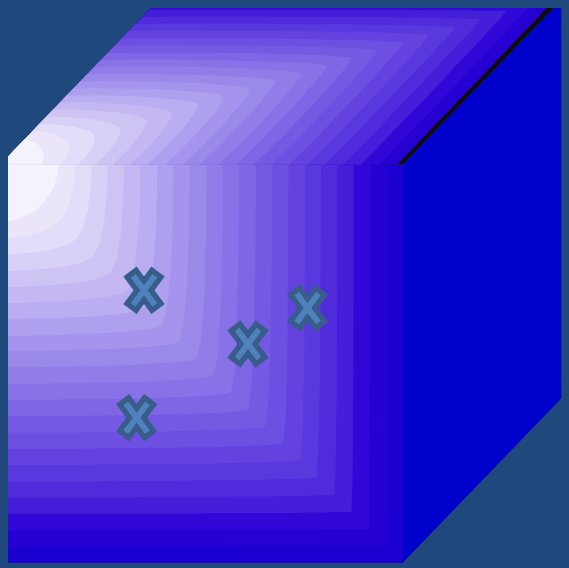
This results from the previous two techniques

Example from TLAP:

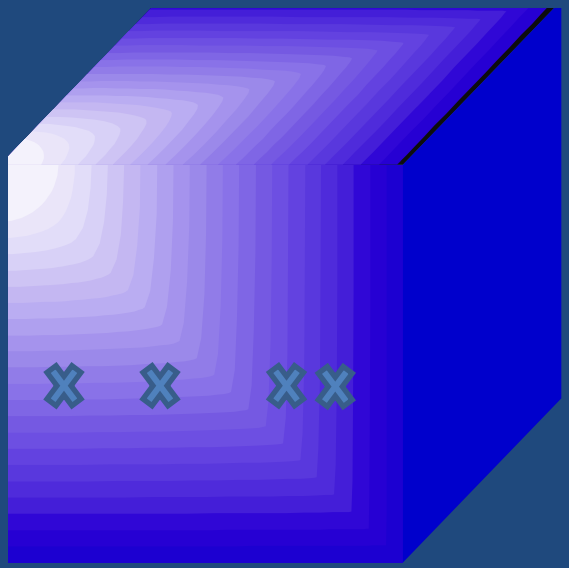
Problem: Given a set of coordinates in 3-D space, which two coordinates are closest to each other?



Reduction #1:
Change 3-D space to 2-D space



Reduction #2:
Or how about 1-D space?



Then once you solve the problem that you know how to solve ...

You take that solution
a step further

6. Look for analogies / similarities.

Similarities between
your problem
and
one that you've already solved
are invaluable

(this one's the hardest because it depends on having experience)

7. Experiment.

If you have a guess
at a solution,
try it!

Just be systematic about it

8. Don’t get frustrated!

You'll have a lot of situations
where
you won't know
what to do next

Use the other 7 techniques to break out of it

OK, that's 8 techniques

We'll see how
some of these are applied with
...

Baby Steps

Summary

1. Solving problems doesn't have to be chaotic!