Assignment 2: Data Structure Hierarchy

You will not be turning in this assignment.
Time allocation (max): thinking, 2 hour; mapping, 3 hours

Build a type hierarchy for the common data structures.

Many data structures depend on other data structures for their definition. For example, rational numbers depend upon integers, since rational numbers are composed of two integers.

Here is *a listing of most common data types*. Can you construct an inheritance hierarchy which defines their dependencies? You can claim that some entries are not data structures. It will also help if you divide the task into subgroups such as elementary data structures, efficient storage structures, mathematical structures, exotic structures, implementation hacks, etc.

bit
byte
bit stream
character
string
stream

truth value
boolean (proposition)
propositional sentence
function
relation
equality relation
partial ordering relation
total ordering relation

set
bag (multiset)
infinite set
ordering (ranking)
non-negative integer
integer
rational number
real number (specific precision)
complex number
random number

object
class
pattern
persistent object

array
sequence
list
linked list
doubly linked list
association list (bucket)
circular list

stack
queue
priority queue
vector
matrix
table
dictionary

tree
binary search tree
balanced binary tree
red-black tree
B-tree
splay tree
binomial heap
fibonacci heap
graph
directed graph
directed acyclic graph
inheritance graph

tuple
hash table

font
screen image
point
2D graphic
3D graphic
sound bite
video image
video stream
color

hyperlink
URL
socket
button
checkbox
panel
window
scrollbar
menu

equation
procedure
buffer
error (exception)
file
directory
continuation
namespace
package
script
pointer

Challenge problem: include *all* of the data structures above in the inheritance hierarchy, noting the arbitrary design decisions (ie some forms support a choice of subcomponents).