Todo

**General**

* Documentation.
  + QuickBook generated.
  + Write full in-source docs simultaneously.
  + Write threading docs simultaneously.
  + Write exception guarantee docs simultaneously.
* Unit tests.
  + All components.
  + Cleanup and in-source documentation.
  + Extend and improve.
  + Pass application verifier.
  + Leak testing.
  + In tests such as PeLib etc ensure at least one module is processed per test, in case the validity check function is the one with a bug.
  + Extra sanity checks to ensure not only that functions return without exception, but also that the returned data is valid. (e.g. GetName in ImpThunk.)
* Examples.
  + All components.
  + Cleanup and in-source documentation.
  + Comprehensive and aimed at providing useful real-world utilities for remote targets out of the box.
  + Pass application verifier.
  + Leak testing.
* Improve quality of existing code.
  + Improve exception-safety guarantees. (Rollback support etc)
  + Improve thread-safety guarantees and threading model.
  + Fix all ‘fixme’ items in code.
  + Const correctness.
  + Fix API to support pointers to const data where possible (rather than using PVOID everywhere).
  + Proper localization and internationalization support/framework.
  + Consider moving from UTF-16 internally to UTF-8, and only using UTF-16 at API boundaries. If implemented, all files and other IO should be in UTF-8.
  + Template concept checking and improved error messages.
  + Compile time checks to ensure MSVC, Boost, etc meet the minimum requirements.
  + Assertions where appropriate.
  + Config header to account for differences in compilers (or compiler versions). Consider Boost.Config.
  + Add support for more compilers (e.g. GCC, Clang).
  + Improved error reporting via exceptions.
  + Support move semantics where appropriate.
  + Support swapping where appropriate (and use to simplify operator= if possible).
  + Support perfect forwarding where appropriate.
  + Everywhere PeFile is used and assumed to be valid, DosHeader and NtHeaders should also be used to ensure validity.
  + Consider using Boost.Iterator to implement iterators.
  + Clean up iterators to be more lightweight, and shift most of the processing to the parent object.
* Improved binary generation and distribution.
  + Binaries with update server.
  + Automatic binary versioning using SVN revision.
  + Automatic build bot.
  + Digital signature (for build bot, WER, etc).
* Shared library build option.
  + Including building dependencies as shared libraries.
* Improve API.
  + Clean up APIs returning pairs/tuples/etc to return objects with named fields and/or getters.
  + STL compatible function objects. (e.g. ‘MemoryMgr::Read<T>’ should return a functor for use in algorithms such as generate\_n.)
    - Consider using Boost.Phoenix to provide lazy expression evaluation and allow richer functionality. (e.g. ‘MemoryMgr::Read<T>’(Addr++) where expression ‘Addr++’ is evaluated on every call, with state maintained across calls, or something to that effect. Needs more investigation.)
    - Should probably be implemented as separate API, to avoid problems caused by implicit conversions and type deduction. (e.g. auto will not behave as expected, function template type deduction will not behave as expected, etc.)
  + Investigate support for optional error reporting via error codes to avoid littering code with try-catch blocks in certain scenarios.
  + Investigate policy based design where appropriate. (e.g. FindPattern offset style, PeFile file type, PeFile ‘bitness’, etc.)
  + Improve API genericity.
    - Instead of taking or returning a vector<T>, instead use a C<T> where ‘C’ is a template parameter representing an arbitrary container.
    - Use ‘ranges’ over direct containers where possible.
* Reduce compile time.
  + Reduce include dependencies.
    - Pointer-to-impl idiom.
    - Forward declarations where possible. (Boost? STL?)
  + PCH support using Boost.Build.
  + Decouple components if possible.
  + Ensure all headers are self-sufficient.
* Todo list.
  + Consider porting to Google Code issue tracker.
* Maintain a changelog.
* Performance improvements in potential bottlenecks (e.g. Iterators, Scanner, PeLib, FindPattern, etc).

**New Modules**

* Helper service to run HadesMem tools as ‘SYSTEM’ for when manipulation certain protected/critical processes (running in separate desktops, sessions, etc.).
  + Ensure service is secure from abuse.
* Debugging.
  + Software breakpoint.
  + Hardware breakpoint (including memory read/write detection).
  + Conditional breakpoints.
  + Single stepping.
  + Stack trace.
* Anti-anti-cheat.
* Thread/process information and enumeration.
* Manual mapper.
  + Windows PE loader reversing.
  + TLS support.
  + Exception handling support. (Safe, rather than catch-all.)
  + No ‘external’ (read: MMHelper) dependencies.
  + Extensive sanity checking on PE file.
  + Manually map dependencies and ‘link’.
* Remote code ‘emulator’.
* Custom GetModuleHandle, GetProcAddress, etc.
* Cheat Engine ‘replacement’.
* C++ WinAPI wrapper.

**Process**

* Constructors that take window or process name should throw if multiple matches are found. In this case, the PID should be used.

**MemoryMgr**

* Clean up memory reading/writing API to reduce use of template metaprogramming in public interface.
* Improve ‘safety’ of remote function caller via EH to minimize risk of crashing the target.
* Improve genericity of parameter passing in remote function caller.
* Memory reading via expression templates.
* Improved type genericity via type decay to ensure templates function correctly in the face of const, volatile, references, etc. (Perfect forwarding?)

**Module**

* Remote GetModuleHandle implementation with same path semantics etc.

**Disassembler**

* Decode calls/jumps to function names if possible.
* NOP/UnNOP support.
* ASM searching API with ‘wildcards’. (MetaASM?)
* String based assembler with x64 support.

**Scanner**

* Rewrite to be more reliable and robust.
* Use a file view with a small memory cache rather than consuming large amounts of RAM.
* Multi-threaded scanning options.
* Wildcard support for vector/string scanning.
* Regex support for string scanning.
* Memory protection filters (read, write, exec).
* Memory type filters (private, mapped, image).
* Support pausing target while scanning.
* Support injected scanning.
* Configurable scan buffer size.
* Pointer scanner.
* Unknown value scan.
* Progressive scan filtering based on either value or criteria.
* Scan history and undo.
* Support case insensitive string scanning.
* Binary scanning.
* Custom scanning via user-supplied predicate.
* Improved floating point support (configurable or ‘smart’ epsilon).
* Group search support.

**Injector**

* .NET injection.
  + Without DLL dependency if possible.
* Cross-section injection.
* IAT injection.
* Varargs/generic export calling.
* Consider NT API based injection (LdrLoadDll).
* Add ‘FreeDll’ API.
* Get address of Kernel32!LoadLibrary ‘manually’ rather than using a local GetProcAddress and pointer arithmetic.
  + Whilst this works in all normal cases, it doesn’t work when the target has shims enabled which hook LoadLibrary.

**Patcher**

* VEH hooking (both INT3 and DR).
* Transactional hooking.
* Improved relative instruction rebuilding (including conditionals). x64 has far more IP relative instructions than x86.
* Freeze target when hooking (except calling thread if applicable – e.g. in injected code).
* Uncopyable, so make moveable.
* VMT hooking.
* IAT/EAT hooking.
* Explicitly support hook chains (and write test).
* Use relative jumps where possible (detect delta at runtime).
* Detect cases where hooking may overflow past the end of a function, and fail. (Provide policy or flag to allow overriding this behaviour.) Examples may be instructions such as ‘int 3’, ‘ret’, ‘jmp’, etc.

**FindPattern**

* Use a file view with a small memory cache rather than consuming large amounts of RAM.
* Pattern generator.
* Multi-threaded scanning.
* ‘Start’ attribute support.
* Data/Rdata scanning support (for ‘start’ attribute and constant scans).
* Support for loading XML file from resource or memory.
* Dump results to file.
* Change parser library from RapidXML to Boot.Spirit (may require change to custom format).
* Object or stream-based implementation that allows operation chaining.
* Improve constructors.
  + I forget what this means exactly… Maybe reduce code duplication? Or provide constructor for custom start/end?
* Improve tests (relative vs absolute regression was missed).
* Optional relative address support (for dumping address where the game has ASLR enabled).

**PeLib**

* Support for working on x86 PE files from x64 and vice versa.
* Finish implementing matching ‘setters’ for existing ‘getters’.
* Extra sanity checking in all components.
  + E.g. Check NumberOfRvaAndSizes in NtHeaders before attempting to retrieve a data dir.
* Cache base pointers etc rather than retrieving it manually in every getter/setter. Slightly less ‘robust’, but due to the typically ‘read-only’ nature of the data this is the expected behaviour in all known cases anyway.
* Consistent API for GetBase. (e.g. PVOID vs PBYTE vs T\*)
* Support more of the PE file format.
  + Overlay data.
  + Resource directory.
  + Exception directory.
  + Relocation directory.
  + Security directory.
  + Debug directory.
  + Load config directory.
  + Delay import directory.
  + Bound import directory.
  + IAT (as opposed to Import) directory.
  + CLR runtime directory support.
* Full support for writing back to PE file, including automatically performing adjustments where required to fit in new data or remove unnecessary space.
* Move to sub-folder to avoid header clashes etc.
* Improve export forwarding code to detect and handle forward-by-ordinal explicitly rather than forcing the user to detect it and do string manipulation and conversion.
* Helper functions such as FindExport, FindImport, HasDataDir, GetArchitecture, etc.