Todo/Notes

**General**

* Todo list.
  + Rewrite this list. (After outlining a ‘definition of done’.)
  + Consider porting to Google Code issue tracker.
* Documentation.
  + Use Doxygen.
  + Improved and expanded documentation. Add notes, cautions, symbols, cross-refs, etc.
  + Threading guarantees.
  + Exception guarantees.
  + Document preconditions, postconditions, and invariants.
  + Better annotations (warnings, notes, etc).
  + Note where handles are inheritable.
  + Note what access control handles are granted.
  + Improved commenting of components.
  + Update doc gen tools and improve doc gen process.
  + Which cleanup operations can silently ‘fail’.
* Build.
  + Change to makefiles.
  + Improve compiler support.
* Tests.
  + Change to Google Test.
  + Write a specially crafted process to use as a sample ‘target’ for unit tests and examples. This way known values can be checked for cases where they are typically unknown, even for our own process.
  + Clean up tests.
  + 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.)
  + More tests for cases that should throw (BOOST\_CHECK\_THROW).
  + Improved test coverage of all APIs (including operator overloads, copy/move constructors, etc).
  + Split up test cases further.
  + Rewrite tests to be less ‘hackish’ and ‘ugly’.
  + Tests for examples.
* Examples.
  + Clean up existing example code.
  + Demonstrate exception handling.
  + Demonstrate multi-threading.
  + Basic memory hacking apps for each component. (IAT fixer, injector, etc.)
* Re-add all components from v1.0.0.
  + FindPattern
  + PeLib
  + ManualMap
  + Scanner
  + Patcher
  + Disassembler (?)
* Review current code for compliance to relevant coding standards/guidelines (Google, Boost, LLVM, etc).
  + Ensure to only conform to standards that apply. Some rules do not apply outside a particular organization (due to history, compatibility, platform, etc) or scope (particularly low level, extreme high performance, etc).
* Optimize all components, both in terms of interface and implementation.
* Remove constructors, destructors, etc where they are no different to those which would be implicitly generated.
  + Rule of Zero: Classes that have custom destructors, copy/move constructors or copy/move assignment operators should deal exclusively with ownership. Other classes should not have custom destructors, copy/move constructors or copy/move assignment operators.
  + Copy constructors are implicitly deleted when there is a user specified move constructor or assignment operator.
  + Move constructors and copy constructors are implicitly generated in most cases (assuming an implicitly generated destructor). Check the rules to verify individual cases.
* Minimize use of Boost and other 3rd party libraries where possible.
  + Remove AsmJit dependency if possible.
  + Remove Boost.Test dependency.
  + Remove Boost.Build dependency.
* Support UNC paths and other more complex path types (<http://msdn.microsoft.com/en-us/library/windows/desktop/aa365247.aspx>).
* Move implementation of (most) header only non-template classes to cpp files.
* Add or remove ‘inline’ qualifications where appropriate.
* Add calling convention detection to Call.
* WriteProcessMemory calls VirtualProtectEx under the hood. Research whether Write can be simplified (and perhaps Read too?).
* Use type erasure where appropriate to hide implementation details of e.g. iterators etc.
* Document how region boundaries are handled in Read/Write.
* Clean up hacky error reporting (caused by makeshift Boost.Exception replacement).
* Investigate cases where unions are being used and whether they violate strict aliasing rules (does using a store of one type and then a load of another type technically violate the standard?).
* Investigate cases where reinterpret\_cast is being used and whether it violates strict aliasing rules (or other type conversion rules).
* Enable MSVC /RTCc flag and fix all truncation errors?
* Perform correct overflow checking.
  + Use SafeInt library?
  + Signed: if (A > INT\_MAX – B) { goto overflow; }
  + Unsigned: if (A + B < A) { goto overflow; }

**New Modules**

* Remote memory ‘pool’ to avoid allocating entire pages for only a few bytes of data.
* Python bindings.
  + Important! Ensure -fno-strict-aliasing is used under GCC as it seems Boost.Python has aliasing violations which cause spurious segfaults and other issues.
* Basic base hook.
* Helper service to run HadesMem tools as ‘SYSTEM’ for when manipulating certain protected/critical processes (running in separate desktops, sessions, etc.).
* Debugging APIs (sw bp, hw bp, conditional bp, single stepping, stack trace, etc).
  + Investigate the debugger engine API (<http://goo.gl/ZV6K7>).
* Thread information and enumeration.
* Remote code ‘emulator’.
* Custom GetModuleHandle, GetProcAddress, etc.

**ManualMap**

* Exception handling support under x86 SafeSEH and x64.
* Improved TLS support.
* CLR hosting support.

**FindPattern**

* Pattern generator.
* ‘Multi-pass’ support (e.g. search for pattern, apply for manipulators, use as starting point for second search).
* Arbitrary region support.

**PeLib**

* Investigate use of virtual functions for file vs memory access (RvaToVa).
  + Alternatively, investigate use of templates, which may ‘merge’ better with x86/x64 cross compatibility.
  + Note: May cause problems when copying ‘PeFile’ type.
* 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.
* 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.
* 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, IsDotNet, GetPDB, etc.
* Test against pathological cases such as Corkami tests.

**Disassembler**

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

**Scanner**

* Rewrite to be more reliable and robust.
* Refactor to reduce code duplication.
* 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.