  - object queue = empty
  - renumber table: old object id/generation to new id/0 = empty
  - xref table: new id -> offset = empty
- Create a QPDF object from a file.
- Write header for new PDF file.
- Request the trailer dictionary.
- For each value that is an indirect object, grab the next object number (via an operation that returns and increments the number). Map object to new number in renumber table. Push object onto queue.
- While there are more objects on the queue:
  - Pop queue.
  - Look up object's new number *n* in the renumbering table.
  - Store current offset into xref table.
  - Write *n* `0 obj`.
  - If object is null, whether direct or indirect, write out null, thus eliminating unresolvable indirect object references.
  - If the object is a stream stream, write stream contents, piped through any filters as required, to a memory buffer. Use this buffer to determine the stream length.
  - If object is not a stream, array, or dictionary, write out its contents.
  - If object is an array or dictionary (including stream), traverse its elements (for array) or values (for dictionaries), handling recursive dictionaries and arrays, looking for indirect objects. When an indirect object is found, if it is not resolvable, ignore. (This case is handled when writing it out.) Otherwise, look it up in the renumbering table. If not found, grab the next available object number, assign to the referenced object in the renumbering table, and push the referenced object onto the queue. As a special case, when writing out a stream dictionary, replace length, filters, and decode parameters as required.

    Write out dictionary or array, replacing any unresolvable indirect object references with null (pdf spec says reference to non-existent object is legal and resolves to null) and any resolvable ones with references to the renumbered objects.
  - If the object is a stream, write `stream\n`, the stream contents (from the memory buffer), and `\nendstream\n`.
  - When done, write `endobj`.

Once we have finished the queue, all referenced objects will have been written out and all deleted objects or unreferenced objects will have been skipped. The new cross-reference table will contain an offset for every new object number from 1 up to the number of objects written. This can be used to write out a new xref table. Finally we can write out the trailer dictionary with appropriately computed /ID (see spec, 8.3, File Identifiers), the cross reference table offset, and `%%EOF`.

7.12. Filtered Streams

Support for streams is implemented through the ***Pipeline*** interface which was designed for this package.