```
package indices is
                type index is non_negative_integer;
                constant index null=0;
                −− = and /= are available and that is all
end indices;

with indices
package line_numbers is
                type linenumber is index;
                −− reexport same ops
end line_numbers;

with indices
package character_pointers is
                type charptr is index;
                −− reexport same ops
end character_pointers;
```

```
with line_numbers character_pointers
package character_list is
                type charlist(size:linenumber);
                procedure create_charlist(cl:in out charlist);
                procedure insert_char_into_charlist(cl:in out charlist,cp:charptr,
                                c:character);
                function number_of_chars(cl:charlist) returns index;
                function get_char_from_charlist(cl:charlist,cp:charptr)
                                returns character;
end character_list;

with character_list
package indexing_table_for_charlist is
                type indextable(size:charptr);
                function create_indextable(it:in out indextable, cl:ptr charlist);
                procedure insert_pair_into_indextable(it:in out indextable,
                                ln:linenumber, cp:charptr);
                function number_of_indices(it:indextable) returns index;
                function get_linenumber_from_indextable(it:indextable,
                                i:index) returns linenumber;
                function get_charptr_from_indextable(it:indextable,
                                i:index) returns charptr;
end character_list;
```

```
with indexing_table_for_charlist
package sorted_indexing_table_for_charlist is
            type sortedindextable
            function create_sortedindextable(sit:in out sortedindextable,
                        cl:ptr charlist);
            procedure insert_pair_into_sortedindextable(
                        sit:in out sortedindextable, ln:linenumber, cp:charptr);
            −− several charptrs can share the same linenumber
            function number_of_indices(it:sortedindextable) returns index;
            function get_linenumber_from_sortedindextable(sit:sortedindextable,
                        i:index) returns linenumber;
            function get_charptr_from_sortedindextable(sit:sortedindextable,
                        i:index) returns charptr;
            −− exceptions for when insertion does not preserve sortedness
end character_list;
```

−− by adjusting whether new charlists are used for circular_shifts and
−− alphabetized_circular_shifts, it is possible to change the
−− implementations of circular_shifts and alphabetized_circular_shifts
−− relatively independently.

Method 1:

```
with sorted_indexing_table_for_charlist
package line_storage is
              −− the internal storage consists of a new sortedindextable pointing
              −− to a new charlist
              −−
end line_storage;

with sorted_indexing_table_for_charlist
package circular_shifts is
              −− the internal storage consists of a new sortedindextable pointing
              −− to an already allocated charlist, namely that of line_storage
              procedure cssetup(rcl:ref charlist);
              −−
end circular_shifts;

with indexing_table_for_charlist
package alphed_circular_shifts is
              −− the internal storage consists of a new indextable pointing
              −− to an already allocated charlist, namely that of line_storage
              procedure alph(rcl:ref charlist);
              −−
end alphed_circular_shifts;
```

Method 2:

```
with sorted_indexing_table_for_charlist
package line_storage is
            −− the internal storage consists of a new sortedindextable pointing
            −− to a new charlist
            −−
end line_storage;

with sorted_indexing_table_for_charlist
package circular_shifts is
            −− the internal storage consists of a new sortedindextable pointing
            −− to a new charlist
            procedure cssetup();
            −−
end circular_shifts;

with indexing_table_for_charlist
package alphed_circular_shifts is
            −− the internal storage consists of a new indextable pointing
            −− to an already allocated charlist, namely that of circular_shifts
            procedure alph(rcl:ref charlist);
            −−
end alphed_circular_shifts;
```

Method 3:

```
with sorted_indexing_table_for_charlist
package line_storage is
            -- the internal storage consists of a new sortedindextable pointing
            -- to a new charlist
            --
end line_storage;

with sorted_indexing_table_for_charlist
package circular_shifts is
            -- the internal storage consists of a new sortedindextable pointing
            -- to a new charlist
            procedure alph(rcl:ref charlist);
            -- but that new charlist is initialized from first one
            --
end circular_shifts;

with indexing_table_for_charlist
package alphed_circular_shifts is
            -- the internal storage consists of a new indextable pointing
            -- to a new charlist
            procedure alph(rcl:ref charlist);
            -- but that new charlist is initialized from first one
            --
end alphed_circular_shifts;

-- Now it is possible to change the ways that characters are stored
-- relatively independently of all the above.
```