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# Programming Strategy

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## Few changes required in database tables

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### No change in the database table structures

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We use `user_info_field` table with special datatype 'name' and `user_info_data` table for additional name fields. And use the standard `user.idnumber` field for student IDs.

We add a restriction for `user_info_field.shortname` with datatype 'name' to avoid confliction with standard user table columns just before a new field to be created, so that we can use additional name fields as selectable and sortable like the user table standard fields.

It requires some workaround for sorting by additional field data with SQL Server or Oracle because of their limitations on TEXT/CLOB field type, such as truncating to VARCHAR type.

### Minor changes required in database table indexes

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We should add indexes on each `user_info_field.shortname` column and `user_info_field.datatype` column for performance.

## Changes required in user listing tables

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We insert the idnumber and additional name field columns for user-listing tables by fixing each sql generator functions and table rendering functions of listing to make those columns sortable as necessary.

## Changes required in core functions

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### Changes in fullname() function for displaying complex full-name

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If the 'fullnamedisplay' language setting value is default, it behaves as same as before.

Otherwise, it checks whether the fullnamedisplay contains besides firstname and lastname. And it gets and merges additional fields if a given parameters do not contain necessary fields. At the time, user.id value may be passwd as 'userid' or 'id' field.

We must consider that the 'id' field name sometimes means another table's id instead of user.id. So, in early versions, we need to verify that firstname and lastname come from the id match with ones passed as parameters. Later, when all the changes are done, we remove the verification process from production mode. (Leaving that process in debugging mode should be useful for plugin developpers.)

For this change, we also have to fix some callers of fullname() that do not give neither userid nor id of user.

## Miscellaneous

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We replace the old style firstname/lastname codes with fullname() function call.