Creatio

Mobile

Development Guide

ACCELERATE

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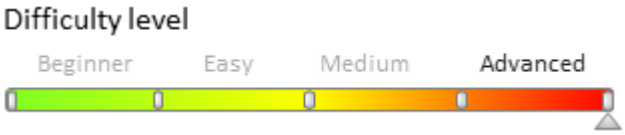
Mobile app architecture



Introduction

There are three approaches to the implementation of mobile applications:

Native mobile application – an application initially developed for a specific mobile platform (iOS, Android, Windows Phone). Such applications are developed using high-level programming languages and compiled in a so-called “native OS code” that ensures the best performance. The main disadvantage of the native mobile applications is that they are not cross-platform.

Mobile web-application – a website adapted to specific mobile device. Web-applications are cross-platform, but they require constant Internet connection, since they are not physically located on the mobile device.

Hybrid application – a web application “encased” in a native shell. Hybrid applications are installed from the online shop (just like the native ones) and have access to the same functions of the mobile device, but are developed using

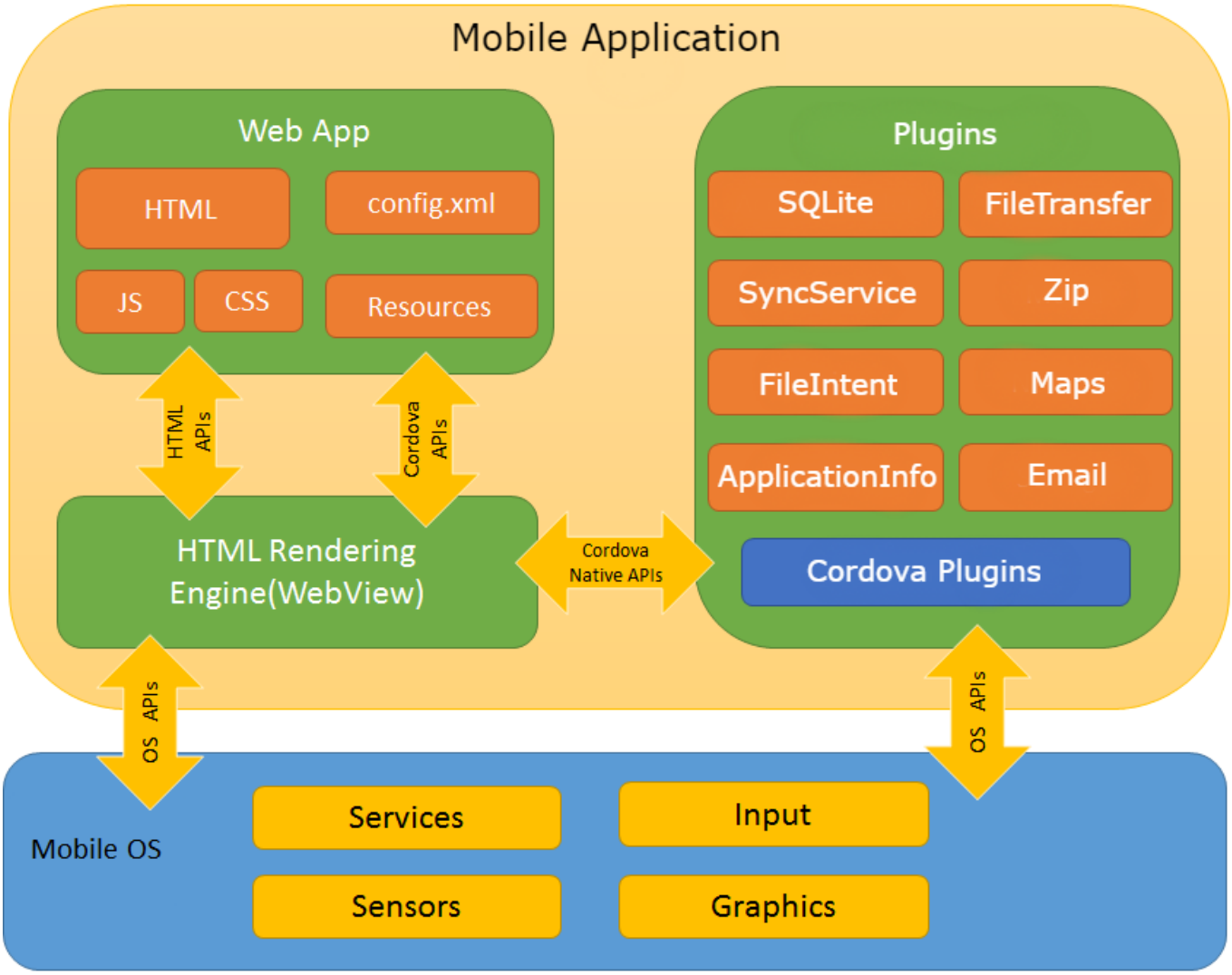
HTML5, CSS and JavaScript. Unlike the native applications, hybrid applications can migrate between different platforms, although their performance is not as good as that of the native applications. Mobile Creatio app is a hybrid application.

General information about the mobile application setup and synchronization, as well as online and offline operation mode specifics are available in the Creatio user guide.

Mobile application architecture

The generalized representation of the mobile application architecture is available on Fig. 1.

Fig. 1 Mobile application architecture



The mobile application uses the capabilities of the Cordova framework to create hybrid applications that are treated as native on a mobile device. The Cordova framework provides access to the mobile application API for interacting with the database or hardware, such as cameras and memory cards. Cordova also provides so-called native plug-ins for working with the APIs of different mobile platforms (iOS, Android, Windows Phone, etc.). Additionally, developing custom plug-ins enables adding new functions and expanding the API. The list of available platforms and the functions of the base native Cordova plug-ins is available here.

The mobile application core is a unified interface for interaction between all other client components of the application. The core uses Javascript files that can be divided into the following categories:

1. Base:

- MVC components (page views, controllers, models)
- Synchronization modules (data import/export, metadata import, file import, etc.)
- web service client classes

- classes that provide access to native plugins.

The base scripts are located in the application assembly, published in the app store.

2. Configuration:

- manifest
- section setup schemas

The application receives the configuration files during synchronization with Creatio server and saves them locally in the device's file system.

Mobile Creatio app operation

A Creatio application in the app store is a set of modules required for synchronization with server (Creatio server used by the "desktop" application). The desktop applications contain all settings and data needed for Mobile Creatio app setup. The following diagram provides an outlay of the Mobile Creatio app routine (Fig. 2):

Fig. 2 Mobile Creatio app operation

After installing the application on a mobile device and connecting to tge Creatio server, the mobile app obtains metadata (application structure and system data) and data from the server.

Due to this operation model, a Mobile Creatio application is compatible with all existing Creatio products. Each product, each separate Creatio website contains its own set of mobile application settings, logic and GUI. All the mobile app user has to do is install the mobile app and connect to the needed website.

Mobile Creatio app operation modes

The mobile app can work in two modes:

- with the main server connection (online)
- without the main server connection (offline)

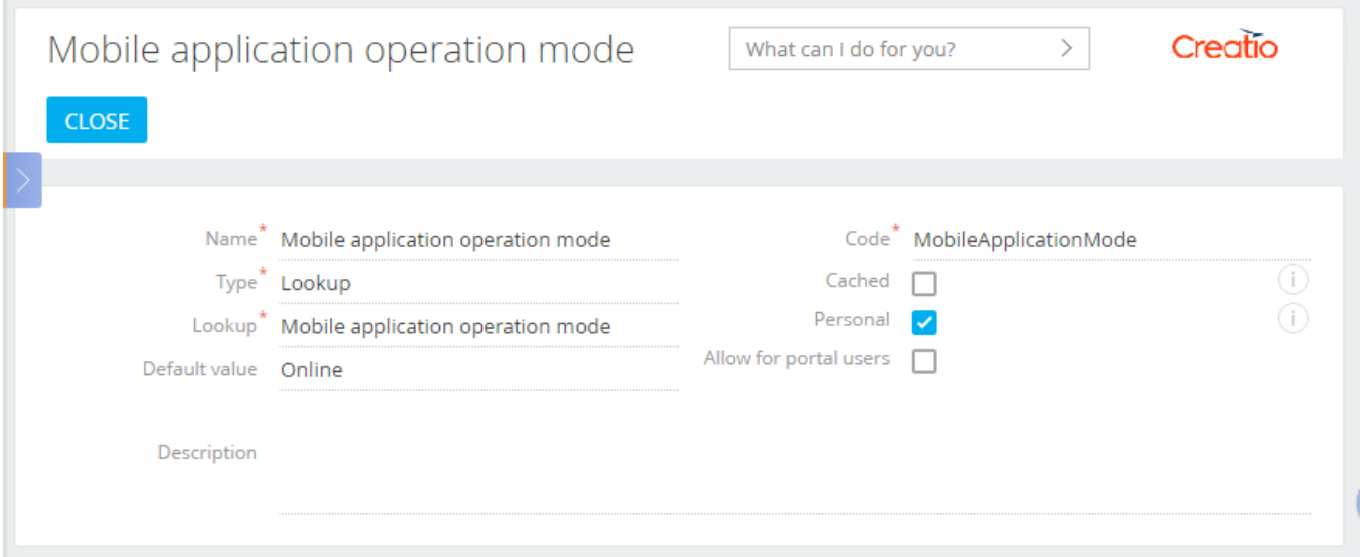
The table 1 shows the comparison between the two modes.

Table 1. Mobile Creatio app operation modes

Online	Offline
Internet connection is required.	Internet connection is not required. Needed only for initial import and synchronization.
Users work with Creatio server directly.	The data are saved locally, on the mobile device.
Synchronization is required only upon configuration changes (adding and deleting columns, changing business logic).	Synchronization is required to update the data and obtain configuration changes.

The mobile application operation mode is set in the [Mobile application operation mode] system setting in Creatio. If you need to change the mobile application operation mode, edit the system setting value and clear the [Personal] checkbox. If different users must have different modes, each user must edit the system setting value with the [Personal] checkbox selected. These users must have access to edit these system settings.

Fig. 3 The [Mobile application operation mode] system setting



Synchronizing mobile application with Creatio

In different mobile app operation modes, synchronization with Creatio has different functions. In the online mode, the synchronization is required only to apply configuration changes. In the offline mode, the synchronization is required both to apply configuration changes and to synchronize the data between the mobile app and the Creatio server. The general process for synchronization performed in the offline is available on Fig. 4.

Fig. 4 General procedure for synchronization in the offline mode

First, the application performs authentication. The current active server session is destroyed upon logout. The application requests data for generating the difference package from the server. The application analyzes the received data and requests updated and/or modified configuration schemas. After loading the schemas, the application obtains system data connected to the cached lookups (the so-called “simple lookups”), system settings, etc. After this, the data exchange with the server commences.

The specifics of the synchronization in the online mode is that it does not have the last two steps.

NOTE

Mobile application version 7.8.6 and up has another synchronization stage: “Data update”. If this function is enabled, this stage is performed after data export and import. The data update stage compares the data available on the server with the local data and, if differences are found, loads the new data and deletes out-of-date data. This mechanism is designed to handle the situations when access permissions are changed or data has been deleted on the server. To enable this step, in the *SyncOptions* section of the manifest, edit the *ModelDataImportConfig* property for the required object-model and set the value of the *IsAdministratedByRights* property to *true*.

How to start the development

Mobile application debugging

During the process of developing custom solutions for the Mobile Creatio application, you need to repeatedly perform application debug. More information about debugging the application code via browser development tools can be found in this article.

Mobile application debugging

Difficulty level

Beginner Easy Medium Advanced

Introduction

During the process of developing custom solutions for the Mobile Creatio application, you need to repeatedly perform *application debug*.

Mobile application is not an **application of a hybrid type** (mobile web application in the native shell) and you can debug it via Google Chrome Developer tools in the Mobile device mode. More information about debugging the application code via browser development tools can be found in the "Client code debugging" article.

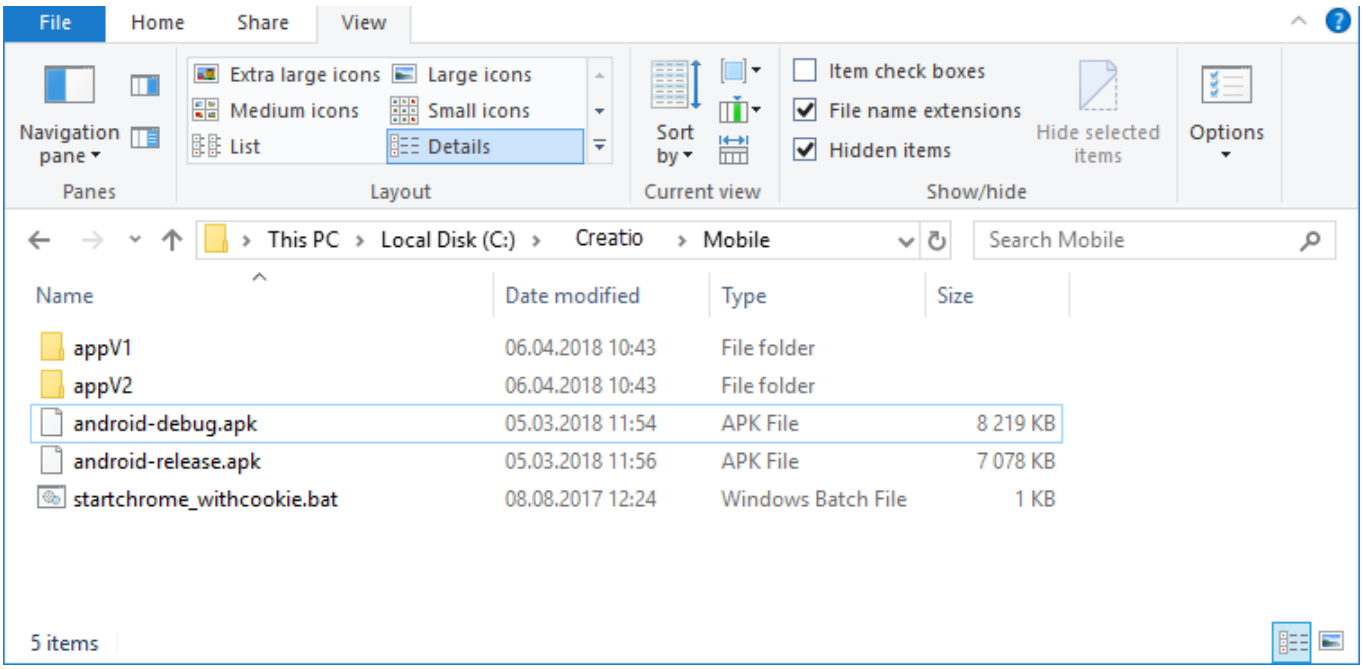
To launch a mobile application in the debug mode:

1. Get the files necessary for debugging the mobile application.
2. Launch the *startchrome.bat*.
3. Enter the debug mode for mobile devices in the Google Chrome.
4. Make the necessary settings and synchronize the mobile application Creatio.

Getting the necessary files

Contact the support team to get the files for debugging a mobile application. Support team will provide an archive with corresponding files. Extract archive to any folder (for example, *C:\creatio\Mobile*) (Fig. 1).

Fig. 1. The contents of the unpacked archive



Launch of the startchrome_withcookie.bat

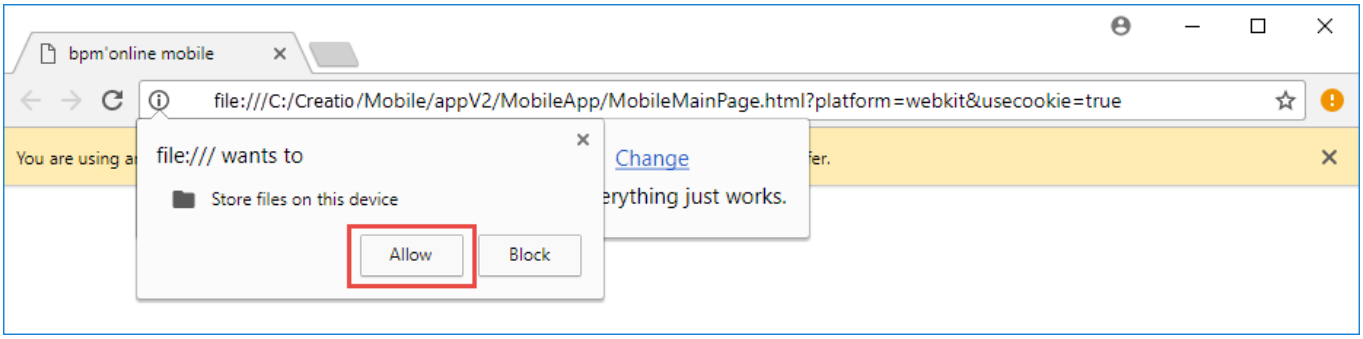
ATTENTION

Close Google Chrome application before you launch *startchrome_withcookie.bat*.

The *startchrome_withcookie.bat* is located in the root folder of unpacked archive. The Google Chrome will launch after executing the startchrome.bat.

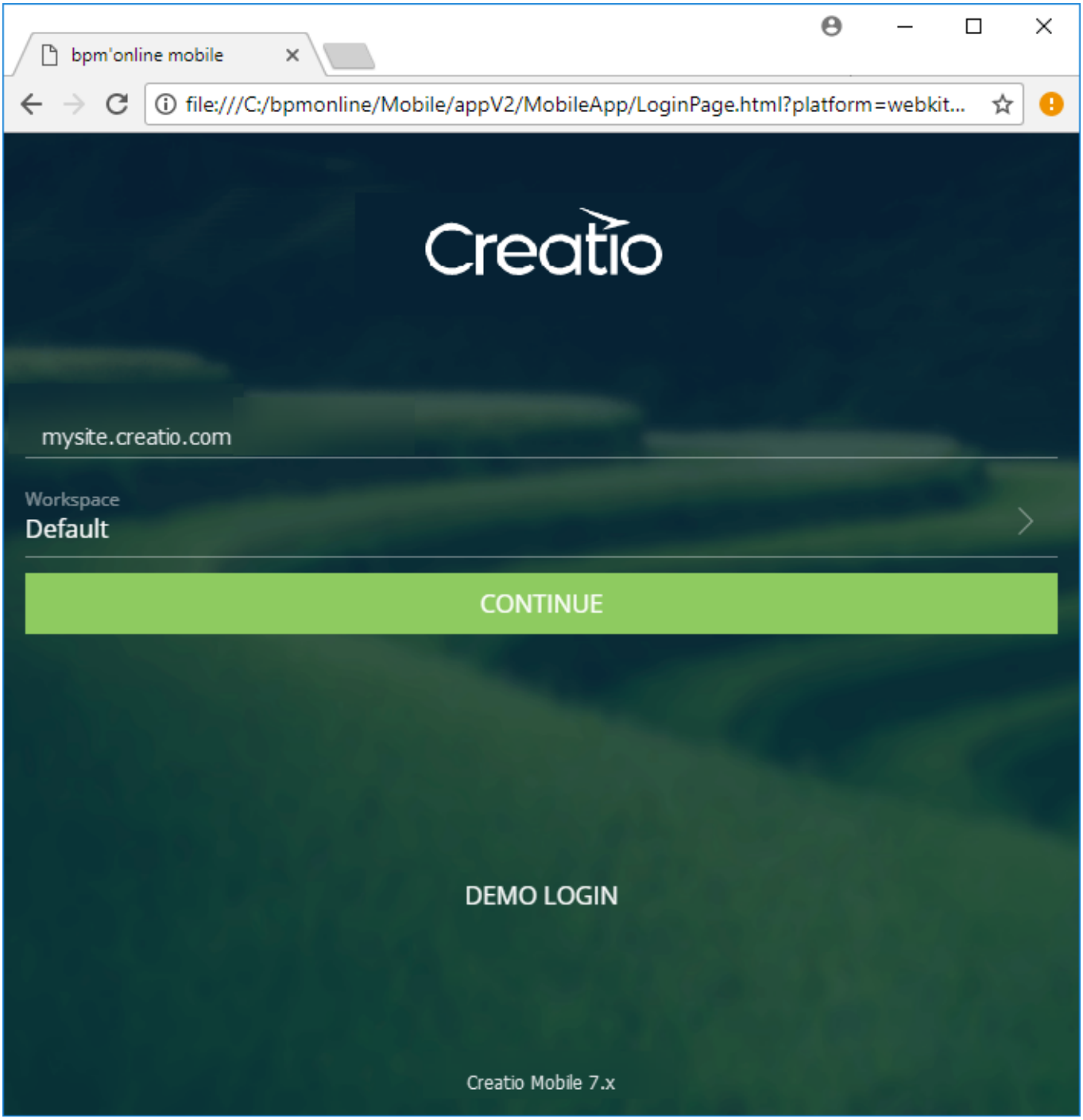
When you first start the browser with the startchrome.bat, an information window will appear, warning you about saving the files to the file system (Fig. 2). Allow the saving of the files. Close the warning about the *--disable-web-security* unsupported file (Fig. 2).

Fig. 2. Information window with warning



The execution of *startchrome_withcookie.bat* will launch the Google Chrome with the settings page of Mobile Creatio application (Fig. 3).

Fig. 3. Mobile application settings page



Switching to mobile application debugging mode

To access the developer tools in Google Chrome, press *F12* key or *Ctrl* + *Shift* + *I* keys. You can debug the local version of the mobile application in the browser. More information about debugging application code via browser development tools can be found in the "Client code debugging" article article.

NOTE

After switching to mobile device display mode, refresh the page by pressing F5 key.

Configuring and synchronization of the mobile application

At first login to the mobile application, you need to enter the HTTP address of the Creatio application on the settings page. To do this, you need to start debug process and click the [Continue] button (Fig. 4). After that, enter user name and password (Fig. 5).

Fig. 4. Settings page of the local mobile application

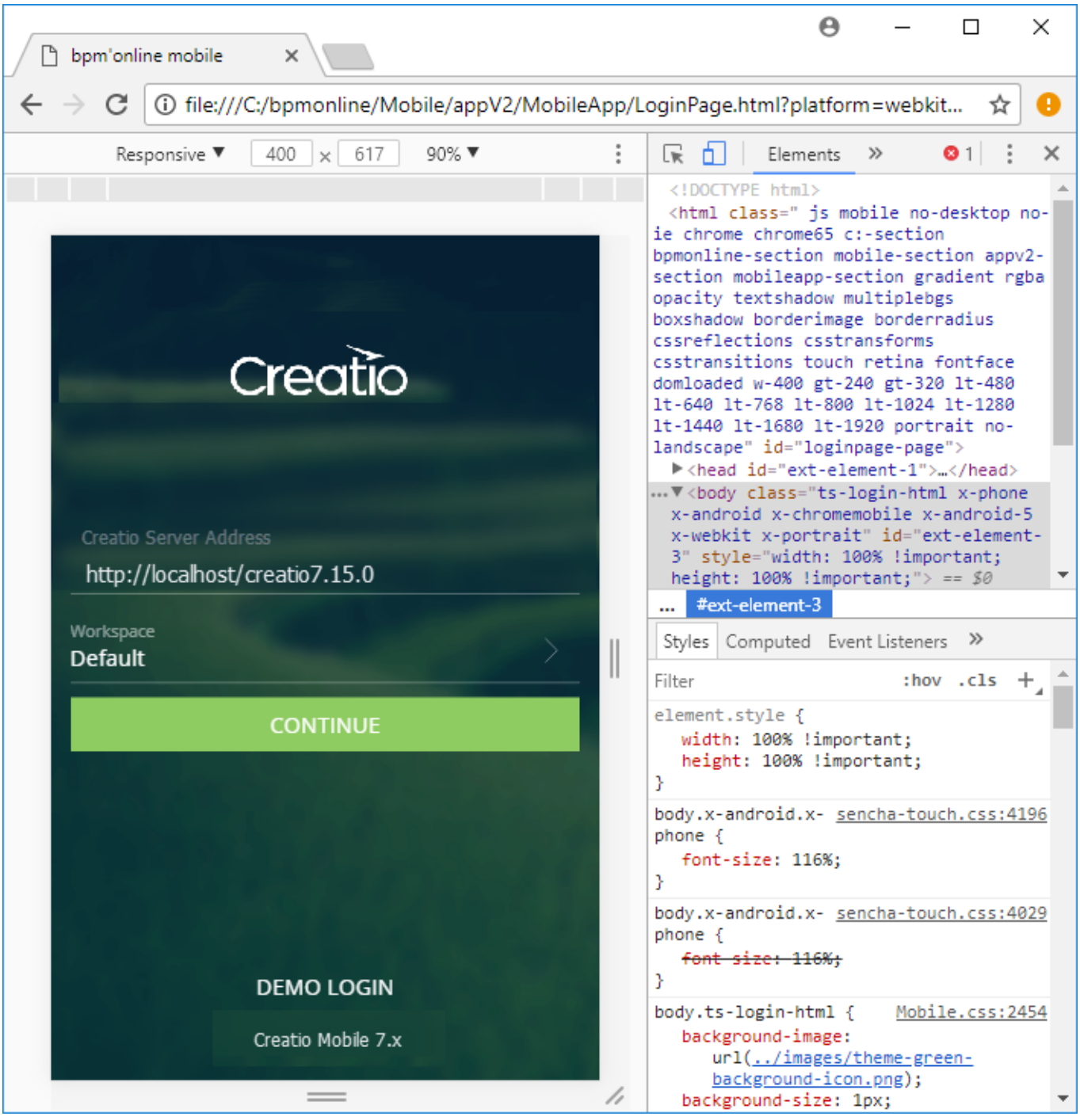
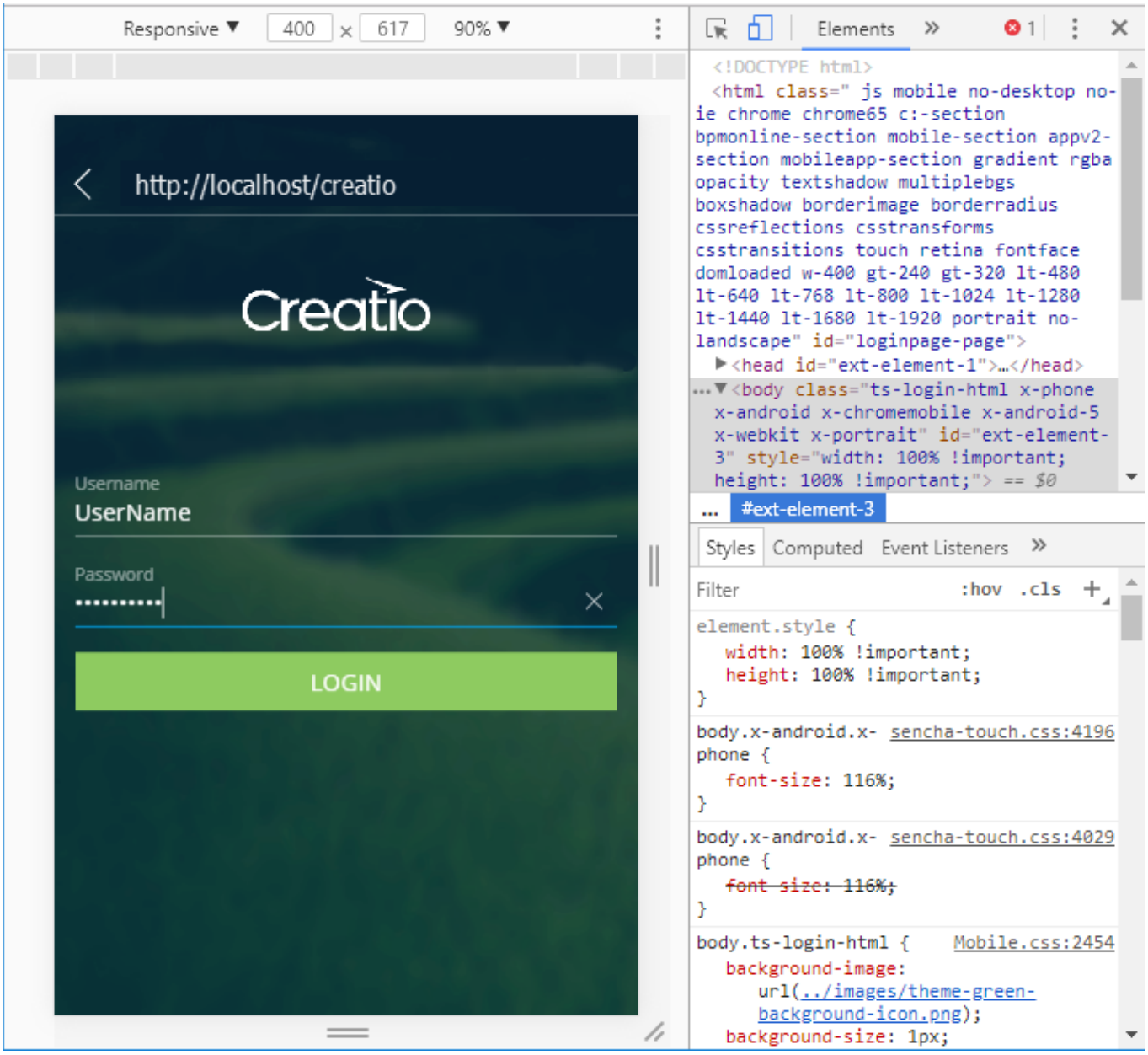


Fig. 5. Login page



After configuration and login, the local version of mobile application will behave as an application installed to the mobile device. The native functions of the mobile device (for example, working with the camera, downloading files, etc.) will not be supported. More information about working with mobile device in Creatio can be found in the Mobile Creatio documentation.

Platform description

Mobile application manifest

The mobile application manifest describes the structure of the mobile app, its objects and connections between them.

- **Manifest. Application interface properties**
- **Manifest. Data and business logic properties**
- **Manifest. Application synchronization properties**
- **Batch mode export**

Page life cycle in mobile application

Each page in the mobile application has several stages during navigation process (opening, closing, unloading, returning to page, etc.). The time passed from loading a page, to unloading it from the mobile device memory is called a page life cycle.

Mobile application background update

The Mobile Creatio application implements a synchronization mechanism for the application structure, which can work automatically in the background.

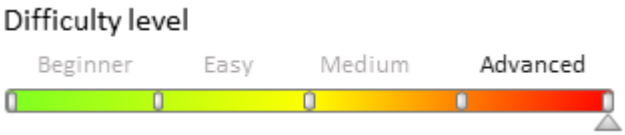
Getting the settings and data from the [Dashboards] section

Getting the settings and the dashboards data is implemented in the *AnalyticsService* service and in the *AnalyticsServiceUtils* utility in the *Platform* package.

Resolving synchronization conflicts automatically

During the synchronization of a mobile app working in the offline mode, the transferred data sometimes cannot be saved.

Mobile application manifest



General provisions

The mobile application manifest describes the structure of the mobile app, its objects and connections between them. The base version of the Mobile Creatio app is described in the manifest located in the *MobileApplicationManifestDefaultWorkspace* schema of the *Mobile* package.

In the process of the mobile app development, the users can add new sections and pages. All of them must be registered in the manifest for the application to be able to work with a new functionality. Since third-party developers have no ability to make changes to the manifest of the base app, the system automatically creates a new updated manifest each time a new section or page is added from the mobile application wizard. The manifest schema name is generated according to the following mask: MobileApplicationManifest[Workplace name]. For example, if the [Field sales] workplace is added to the mobile app, the system generates a new manifest schema with the name MobileApplicationManifestFieldForceWorkspace.

Mobile application manifest structure

The mobile application manifest is a configuration object whose properties describe the structure of the mobile app. Table 1 contains names and descriptions of the mobile application manifest.

Table 1. Manifest configuration object properties

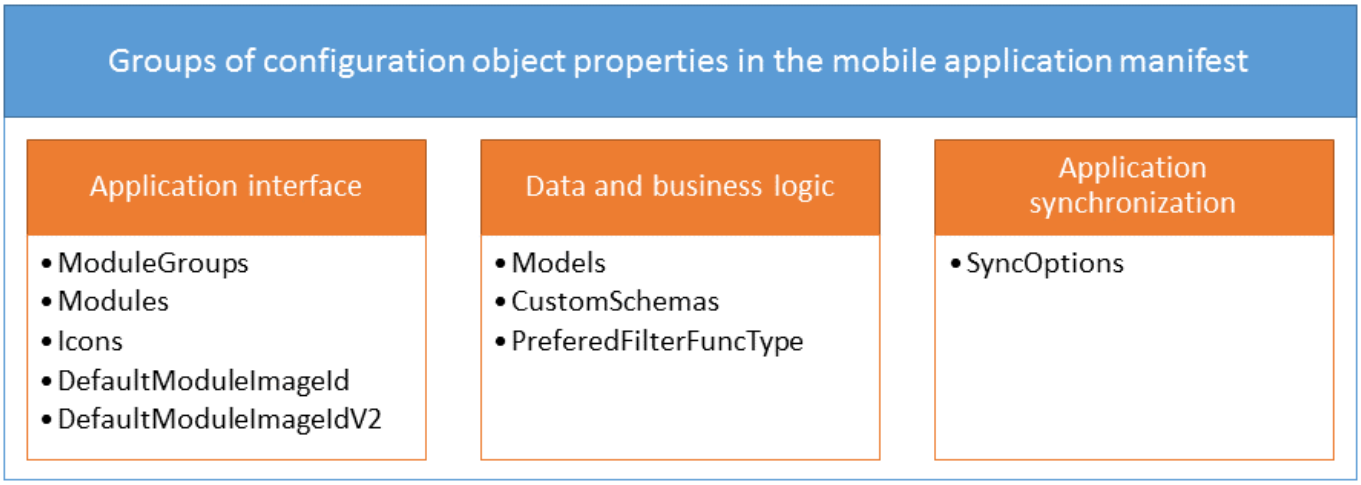
Property	Purpose
ModuleGroups	Contains upper-level settings of the main menu groups.
Modules	Describes the properties of the mobile app modules.
SyncOptions	Describes data synchronization parameters.
Models	Contains configuration of the imported application models.
PreferedFilterFuncType	Determines the operation that will be used to search and filter data.

CustomSchemas	Connects additional schemas to the mobile app.
Icons	Enables adding custom images to the app.
DefaultModuleImageId	Sets default image for UI V1.
DefaultModuleImageIdV2	Sets default image for UI V2.

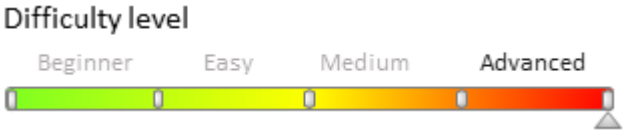
All properties of a configuration object in the manifest can be split into three general groups (Fig. 1):

- *Application interface properties* contain properties that implement the mobile app interface. By using the properties in this group, the application sections and main menu are shaped and custom images are configured. For more information about this group's properties please refer to the "**Manifest. Application interface properties**" article.
- *Data and business logic properties* contain properties where imported data and custom logic is described. For more information about this group's properties please refer to the "**Manifest. Data and business logic properties**
- *Application synchronization properties* contain a single property for synchronization with the primary application. For more information about this property please refer to the "**Manifest. Application synchronization properties**" article.

Fig. 1. Groups of configuration object properties in the configuration manifest



Manifest. Application interface properties



General information

The conditional property group of the configuration object manifest contains properties that form the mobile application interface. By using the properties of this group, you can form application sections, main menus, custom images, etc. Read more about the mobile application manifest and its properties in the "**Mobile application manifest**" article.

ModuleGroups property

Application module groups. Describes the upper-level group setting of the mobile application main menu. The ModuleGroups property sets a list of named configuration objects for each menu group with the only possible Position property (see table 1).

Table 1 The configuration object property for the menu group setup.

Property	Value

Position	Group position in the main menu. Strats with 0.

Example

Setting up the mobile application menu with two groups — the main group and the [Sales] group.

```
// Mobile application module groups.
"ModuleGroups": {
    // Main menu group setup.
    "main": {
        // Group position in the main menu.
        "Position": 0
    },
    // [Sales] menu group setup.
    "sales": {
        // Group position in the main menu.
        "Position" 1
    }
}
```

Modules property

Mobile application modules. A module is an application section. Each module in the [Modules] configuration object manifest describes a configuration object with properties given in table 2. The name of the configuration section object must match the name of the model that provides section data.

Table 2 Section configuration object properties.

Property	Value
Group	The application menu group that contains the section. Set by the string containing the menu section name from the *ModuleGroups* property of the manifest configuration object.
Model	Model name that contains the section data. Set by the string containing the name of one of the models included in the *Models* property of the manifest configuration object.
Position	Section position in the main menu group. Set by a numeric value starting with 0.
Title	Section title. String with the section title localized value name. Section title localized value name should be added to the *[LocalizableStrings]* manifest schema block.
Icon	This property designed to import custom images to the version 1 user interface menu section.
IconV2	This property designed to import custom images to the version 2 user interface menu section.
Hidden	Checkbox that defines a section is displayed in the menu (*true* — hidden, *false* — displayed). Optional property. By default — *false*.

Example

Set up the application sections:

1. Main menu sections: [Contacts], [Accounts].
2. The application starting page: the [Contacts] section.

Strings containing the section titles should be created in the [LocalizableStrings] manifest schema block:

- ContactSectionTitle with the "Contacts" value.
- AccountSectionTitle with the "Accounts" value.

```
// Mobile application modules.
"Modules": {
    // "Contact" section.
```

```
    "Contact": {
        // The application menu group that contains the section.
        "Group": "main",
        // Model name that contains the section data.
        "Model": "Contact",
        // Section position in the main menu group.
        "Position": 0,
        // Section title.
        "Title": "ContactSectionTitle",
        // Custom image import to section.
        "Icon": {
            // Unique image ID.
            "ImageId": "4c1944db-e686-4a45-8262-df0c7d080658"
        },
        // Custom image import to section.
        "IconV2": {
            // Unique image ID.
            "ImageId": "9672301c-e937-4f01-9b0a-0d17e7a2855c"
        },
        // Menu display checkbox.
        "Hidden": false
    },
    // "Account" section.
    "Account": {
        // The application menu group that contains the section.
        "Group": "main",
        // Model name that contains the section data.
        "Model": "Account",
        // Section position in the main menu group.
        "Position": 1,
        // Section title.
        "Title": "AccountSectionTitle",
        // Custom image import to section.
        "Icon": {
            // Unique image ID.
            "ImageId": "c046aa1a-d618-4a65-a226-d53968d9cb3d"
        },
        // Custom image import to section.
        "IconV2": {
            // Unique image ID.
            "ImageId": "876320ef-c6ac-44ff-9415-953de17225e0"
        },
        // Menu display checkbox.
        "Hidden": false
    }
}
```

Icons property

This property is designed to import custom images to the mobile application.

It is set by the configuration objects array, each containing properties from the table 3.

Table 3 The configuration object properties for the custom image import.

Property	Value
ImageListId	Image list ID.
ImageId	Custom image ID from the *ImageListID* list.

Example

```
// Custom images import.
"Icons": [
    {
        // Image list ID.
        "ImageListId": "69c7829d-37c2-449b-a24b-bcd7bf38a8be",
        // Imported image ID.
        "ImageId": "4c1944db-e686-4a45-8262-df0c7d080658"
    }
]
```

DefaultModuleImageId and DefaultModuleImageIdV2 properties

Properties are designed to set unique default image IDs for newly created sections or sections that don't contain IDs of the images in the *Icon* or *IconV2* properties of the *Modules* property of the configuration object manifest.

Example

```
// Custom interface V1 default image ID.
"DefaultModuleImageId": "423d3be8-de6b-4f15-a81b-ed454b6d03e3",
// Custom interface V2 default image ID.
"DefaultModuleImageIdV2": "1c92d522-965f-43e0-97ab-2a7b101c03d4"
```

Manifest. Data and business logic properties

Difficulty level

General provisions

The groupof properties of a configuration object in the mobile app manifest. contains properties that describe imported data, as well as custom business logic for processing data in the mobile app. For more information about the mobile application manifest and all its properties, please refer to the "**Mobile application manifest**" article.

The Models property

The Models property contains imported application models. Each model in a property is described by a configuration object with a corresponding name. The model configuration object properties are listed in table 1.

Table 1. Model configuration object properties

Property	Value
Grid	Model list page schema name. The page will be generated automatically with the following name: Mobile[Model_name][Page_type]Page. Optional.
Preview	Preview page schema name for model element. The page will be generated automatically with the following name: Mobile[Model_name][Page_type]Page. Optional.
Edit	Edit page schema name for model element. The page will be generated automatically with the following name: Mobile[Model_name][Page_type]Page. Optional.
RequiredModels	Names of the models that the current model depends on. Optional property. All models, whose columns are added to the current model, as well as columns for which the current model has external keys.
ModelExtensions	Model extensions. Optional property. An array of schemas, where additional model settings are implemented (adding business rules, events, default values, etc.).
PagesExtensions	Model page extensions. Optional property. An array of schemas where additional settings for various page types are implemented (adding details, setting titles, etc.).

Case example

Add the following model configurations to the manifest:

1. Contact. Specify list page, view and edit page schema names, required models, model extension modules and model pages.
2. Contact address. Specify only the model extension module.

The *Models* property of a manifest configuration item must look like this:

```
// Importing models.
"Models": {
    // "Contact" model.
    "Contact": {
        // List page schema.
        "Grid": "MobileContactGridPage",
        // Display page schema.
        "Preview": "MobileContactPreviewPage",
        // Edit page schema.
        "Edit": "MobileContactEditPage",
        // The names of the models the "Contact" model depends on.
        "RequiredModels": [
            "Account", "Contact", "ContactCommunication", "CommunicationType",
"Department",
            "ContactAddress", "AddressType", "Country", "Region", "City",
"ContactAnniversary",
            "AnniversaryType", "Activity", "SysImage", "FileType",
"ActivityPriority",
            "ActivityType", "ActivityCategory", "ActivityStatus"
        ],
        // Model extensions..
        "ModelExtensions": [
            "MobileContactModelConfig"
        ],
        // Model page extensions.
        "PagesExtensions": [
            "MobileContactRecordPageSettingsDefaultWorkplace",
            "MobileContactGridPageSettingsDefaultWorkplace",
            "MobileContactActionsSettingsDefaultWorkplace",
            "MobileContactModuleConfig"
        ]
    },
    // "Contact addresses" model.
    "ContactAddress": {
        // List, display and edit pages were generated automatically.
        // Model extensions..
        "ModelExtensions": [
            "MobileContactAddressModelConfig"
        ]
    }
}
```

The PreferedFilterFuncType property

The property defines the operation used for searching and filtering data in the section, detail and lookup lists. The value for the property is specified in the a an enumeration Terrasoft.FilterFunctions enumeration. The list of filtering functions is available in table 2.

Table 2. Filtering functions (Terrasoft.FilterFunctions)

Function	Value
SubStringOf	Determines whether a string passed as an argument, is a substring of the *property* string.

ToUpper	Returns values of the column specified in the *property* in relation to upper list.
EndsWith	Verifies if the *property* column value ends with a value passed as argument.
StartsWith	Verifies if the *property* column value starts with a value passed as argument.
Year	Returns year based on the *property* column value.
Month	Returns month based on the property column value.
Day	Returns day based on the property column value.
In	Checks if the property column value is within the value range passed as the function argument.
NotIn	Checks in the property column value is outside the value range passed as the function argument.
Like	Determines if the *property* column value matches the specified template.

If the current property is not explicitly initialized on the manifest, then by default the *Terrasoft.FilterFunctions.StartWith* function is used for search and filtering, as this ensures the proper indexes are used in the SQLite database tables.

Case example

Use the substring search function for data search.

The PreferedFilterFuncType property of the configuration object in the manifest must look like this:

```
// Substring search function is used to search for data.
"PreferedFilterFuncType": "Terrasoft.FilterFunctions.SubStringOf"
```

ATTENTION

If the function specified as the data filtering function in the PreferedFilterFuncType section is not *Terrasoft.FilterFunctions.StartWith*, then *indexes will not be used while searching* database records.

The CustomSchemas property

The CustomSchemas property is designed for connecting additional schemas to the mobile app (custom schemas with source code in JavaScript) that expand the functionality. This can be additional classes implemented by developers as part of a project, or utility classes that implement functions to simplify development, etc.

The value of the property is an array with the names of connected custom schemas.

Case example

Connect additional custom schemas for registering actions and utilities.

```
//
"CustomSchemas": [
    // Custom action registration schema.
    "MobileActionCheckIn",
    // Custom utility schema.
    "CustomMobileUtilities"
]
```

Manifest. Application synchronization properties

Difficulty level

General information

The conditional property group of the manifest configuration object contains a single property used to synchronize data with the main application. Read more about the mobile application manifest and its properties in the "**Mobile application manifest**" article.

SyncOptions Property

Describes the options for configuring data synchronization. Contains the configuration object with properties presented in table 1.

Table 1 The configuration object properties for the synchronization setup.

Property	Value
ImportPageSize	The number of pages imported in the same thread.
PagesInImportTransaction	The number of import threads.
SysSettingsImportConfig	Imported system settings array.
SysLookupsImportConfig	Imported system lookups array.
ModelDataImportConfig	An array of models that will load the data during synchronization.

In the *ModelDataImportConfig* model array, you can specify additional synchronization parameters, the list of available columns and filter conditions for each model. If you need to load a full model during synchronization, specify the object with the model name in the array. If the model needs to apply additional conditions for synchronization, the configuration object with properties given in table 2 is added to the *ModelDataImportConfig* array.

Table 2 The configuration object properties for the synchronization model setup.

Property	Value
Name	Model name (see *Models* property of the manifest configuration object).
SyncColumns	The column models array for which data is imported. In addition to the listed columns, the system columns (CreatedOn, CreatedBy, ModifiedOn, ModifiedBy) and primary displayed columns will also be imported during synchronization.
SyncFilter	The filter applied to the model during import

The *SyncFilter* is applied to the model during import is a configuration object with properties given in table 3.

Table 3 Filter model configuration object properties.

Property	Value
type	Filter type. Set by the enumeration value *Terrasoft.FilterTypes*. Optional property. By default *Terrasoft.FilterTypes.Simple*. Filter types (*Terrasoft.FilterTypes*): *Simple* — Filter with one condition. *Group* — Group filter with multiple conditions.
logicalOperation	The logical operation for combining a collection of filters (for filters with *Terrasoft.FilterTypes.Group* type). Set by the enumeration value *Terrasoft.FilterLogicalOperations*. By default - *Terrasoft.FilterLogicalOperations.And*. Logical operation types (*Terrasoft.FilterLogicalOperations*): *Or* — Logical operation OR. *And* — Logical operation AND.
subfilters	A collection of filters applied to a model. Obligatory property for the filter type *Terrasoft.FilterTypes.Group*. The filters are interconnected by the logical operation set in the *logicalOperation* property. Each filter is a configuration filter object.

property	Filtered column model name. Obligatory property for the filter type *Terrasoft.FilterTypes.Simple*.
valueIsMacrosType	The checkbox that defines whether the filtered value is a macro. Optional property can be: *true* if the filter uses a macro, and *false* if it doesn't.
value	Value of the column filtration set in the *property* property. Obligatory property for the filter type *Terrasoft.FilterTypes.Simple*. Can be set directly by the filter value (including *null*) or a macro (the valueIsMacrosType property must be set to *true*). Macros that can be used as the property value are contained in the *Terrasoft.ValueMacros* enumeration.

Value macros (*Terrasoft.ValueMacros*):

CurrentUserContactId	Current user ID.
CurrentDate	Current date.
CurrentDateTime	Current date and time.
CurrentDateEnd	Current date end.
CurrentUserContactName	Current contact name.
CurrentUserContact	Current contact name and ID.
SysSettings	System setting value. The system setting name is included in the *macrosParams* property.
CurrentTime	Current time.
CurrentUserAccount	Current account name and ID.
GenerateUId	Generated ID.

macrosParams	Values transitioned to macros as parameters. Optional property. This property is now used only for the *Terrasoft.ValueMacros.SysSettings* macro.
isNot	Applied to the negation operator filter. Optional property. Takes the *true* value if the the negation operator is applied to the filter, otherwise — *false*.
funcType	Function type applied to the model column set in the *property* property. Optional property. Takes values from the *Terrasoft.FilterFunctions* enumeration. Argument values for the filtration functions are set in the *funcArgs* property. The value to compare the result of the function is specified by the *value* property.

Filtration functions (*Terrasoft.FilterFunctions*):

SubStringOf	Determines whether the string passed in as an argument is a substring of the *property* column.
ToUpper	Changes the column value set in the *property* to uppercase.
EndsWith	Checks whether the value in the *property* column ends with the value set as an argument.
StartsWith	Checks if the value of the *property* column starts with the value set as an argument.
Year	Returns the year value according to the *property* column.
Month	Returns the month value according to the *property* column.
Day	Returns the day value according to the *property* column.
In	Checks the occurrence of the value of the column property in the range of values that is passed as argument to the function.
NotIn	Checks for the absence of the value of the column property in the range of values that is passed as an argument to the function.
Like	Determines whether the value of the column property with the specified template.

funcArgs	An array of argument values for the function filter defined in the *funcType* property. The order of the values in the array *funcArgs* must match the order of parameters of the *funcType* function.
name	The name of a filter or group of filters. Optional property.
modelName	Filtered model name. Optional property Specifies whether the filtering is performed by the columns of the connected model.
assocProperty	Connected model column by which the main model is connected. The primary column serves as a connecting column of the main model.
operation	Filtration operation type. Optional parameter. Takes values from the *Terrasoft.FilterOperation* enumeration. By default — *Terrasoft.FilterOperation.General*. Filtration operations (*Terrasoft.FilterOperation*): *General* — Standard filtration. *Any* — Filtration by the *exists* filter.
compareType	Filter comparison operation type. Optional parameter. Takes values from the *Terrasoft.ComparisonType* enumeration. By default — *Terrasoft.ComparisonType.Equal*. Comparison operations (*Terrasoft.ComparisonType*): *Equal* — Equal. *LessOrEqual* — Less or equal. *NotEqual* — Not equal. *Greater* — Greater. *GreaterOrEqual* — Greater or equal. *Less* — Less.

Example

During synchronization, the data for the following models has to be loaded into the mobile application:

1. Activity All columns are loaded. While the model is being filtered, only the activities with the current user listed as a participant are loaded.
2. Activity type — a full model is loaded.

The *SyncOptions* property of the manifest configuration object must look like this:

```
// Synchronization settings
"SyncOptions": {
    // The number of pages imported in the same thread.
    "ImportPageSize": 100,
    // The number of import threads.
    "PagesInImportTransaction": 5,
    // Imported system settings array.
    "SysSettingsImportConfig": [
        "SchedulerDisplayTimingStart", "PrimaryCulture", "PrimaryCurrency",
"MobileApplicationMode", "CollectMobileAppUsageStatistics",
"CanCollectMobileUsageStatistics", "MobileAppUsageStatisticsEmail",
"MobileAppUsageStatisticsStorePeriod", "MobileSectionsWithSearchOnly",
"MobileShowMenuOnApplicationStart", "MobileAppCheckUpdatePeriod",
"ShowMobileLocalNotifications", "UseMobileUIV2"
    ],
    // Imported system lookups array.
    "SysLookupsImportConfig": [
        "ActivityCategory", "ActivityPriority", "ActivityResult",
"ActivityResultCategory", "ActivityStatus", "ActivityType", "AddressType",
```

```
"AnniversaryType", "InformationSource", "MobileApplicationMode",
"OppContactInfluence", "OppContactLoyality", "OppContactRole", "OpportunityStage",
"SupplyPaymentDelay", "SupplyPaymentState", "SupplyPaymentType"],
    // An array of models that will load the data during synchronization.
    "ModelDataImportConfig": [
        // Activity model configuration.
        {
            "Name": "Activity",
            // The filter applied to the model during import
            "SyncFilter": {
                // Filtered column model name.
                "property": "Participant",
                // Filtered model name.
                "modelName": "ActivityParticipant",
                // Connected model column by which the main model is connected.
                "assocProperty": "Activity",
                // Filtration operation type.
                "operation": "Terrasoft.FilterOperations.Any",
                // A macro is used for filtration.
                "valueIsMacros": true,
                // Column filtration value – current contact ID and name.
                "value": "Terrasoft.ValueMacros.CurrentUserContact"
            },
            // The column models array for which data is imported.
            "SyncColumns": [
                "Title", "StartDate", "DueDate", "Status", "Result",
"DetailedResult", "ActivityCategory", "Priority", "Owner", "Account", "Contact",
"ShowInScheduler", "Author", "Type"
            ]
        },
        // The ActivityType model is loaded in full.
        {
            "Name": "ActivityType",
            "SyncColumns": []
        }
    ]
}
```

The SyncOptions.ModelDataImportConfig.QueryFilter property

Available in the application starting with version 7.12.1 and in the mobile application starting with version 7.12.3.

The *QueryFilter* synchronization property enables to configure data filtering of the specific model when importing via the DataService service. Previously, the *SyncFilter* property was used to filter data and the import was performed via the OData (EntityDataService).

ATTENTION

Data import via the DataService service is available only for the Android and iOS platforms. The OData (EntityDataService) is used for the Windows platform.

The *QueryFilter* filter is a set of parameters in the form of JSON object that are sent in the request to the DataService service. Description of the DataService parameters can be found in the "DataService. Data filtering" development guide article.

Example of the exists filter is available below:

```
{
  "SyncOptions": {
     "ModelDataImportConfig": [
        {
           "Name": "ActivityParticipant",
           "QueryFilter": {
              "logicalOperation": 0,
```

```
                "filterType": 6,
                "rootSchemaName": "ActivityParticipant",
                "items": {
                   "ActivityFilter": {
                      "filterType": 5,
                      "leftExpression": {
                         "expressionType": 0,
                         "columnPath": "Activity.[ActivityParticipant:Activity].Id"
                      },
                      "subFilters": {
                         "logicalOperation": 0,
                         "filterType": 6,
                         "rootSchemaName": "ActivityParticipant",
                         "items": {
                            "ParticipantFilter":{
                               "filterType": 1,
                               "comparisonType": 3,
                               "leftExpression": {
                                  "expressionType": 0,
                                  "columnPath": "Participant"
                               },
                               "rightExpression": {
                                  "expressionType": 1,
                                  "functionType": 1,
                                  "macrosType": 2
                               }
                            }
                         }
                      }
                   }
                }
             }
          }
       ]
    }
}
```

Batch mode export

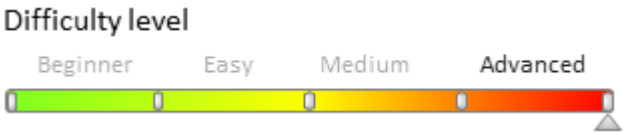
Difficulty level

By default, the mobile application sends the changes made by the users to the server one at a time, i.e. every adjustment results in at least one server request. A large number of changes may lead to a significant amount of time for processing them.

Starting with version 7.9, it is possible to send data in batch mode, and significantly speed up the process of sending data to the server.

To enable the batch mode, set the *UseBatchExport* property to *true* in the *SyncOptions* section of the mobile application manifest. As a result, all user changes will be grouped into several batch requests according to the operation type. Possible operation types - insert, update and delete.

Page life cycle in mobile application



Introduction

Each page in the mobile application has several stages during navigation process (opening, closing, unloading, returning to page, etc.). The time passed from loading a page, to unloading it from the mobile device memory is called a page life cycle.

For each stage of page life cycle provided the corresponding page event. Use page events to expand functionality. Main page events:

- initialization of the view
- completion of class initialization
- page loading
- data uploading
- page closing.

Understanding the page life cycle stages enables you to enlarge the logic of the pages.

Life cycle stages

ATTENTION

Only one page can be displayed on the mobile phone screen. Tablet PC can display one page in a portrait orientation and two pages in a landscape orientation. Due to this, the page life cycle differs for the phone and the tablet.

Page opening

At first opening of the page, all scripts necessary for the work of the page are being loaded. After that the controller is being initialized and the view is created.

Sequence of page opening event generation:

1. *initializeView* – view initialization.

2. *pageLoadComplete* – event of completion of the page loading.

3. *launch* – initiates data loading.

Page closing

When the page is closed, it's view is deleted from the document object model (DOM) and controller is being deleted from the device memory.

Page is closed in the following cases:

- The [Back] button is pressed. In this case the last page is being deleted.
- New section was opened. In this case all pages that were opened before are being deleted.

pageUnloadComplete – the event of page closing completion.

Page unloading

Unloading is performed after the passing to another page in the same section. The current page becomes inactive. It can stay visible on the device screen. For example, if you open a view page from the list on the tablet PC, the list page will stay visible. In the same case on the phone, the list page will not be visible but will stay in the memory. This is the difference between unloading and closing a page.

pageUnloadComplete – the event of page unload (coincides with the event of the page closing).

Return to the page

Return to the unloaded page is performed by pressing the [Back] button.

pageLoadComplete – returning to the page event.

ATTENTION

Only one instance of the page can be used in the application. If you consistently open two identical pages and return to the first page, the *launch* event handler will be executed again. This should be taken into account in the development.

Life cycle event handlers

Page controller classes are inherited from the *Terrasoft.controller.BaseConfigurationPage* class that provides methods of handling the life cycle events.

initializeView(view)

Method is called after the page view in the DOM is being created (but was not rendered). On this stage you can subscribe to the events of the view classes and perform additional actions with DOM.

pageLoadComplete(isLaunch)

Provides extension of the logic that is executed at the page load and return. The *true* value of the *isLaunch* parameter indicates that the page is being loaded for the first time.

launch()

Called only when the page is opened. The method initiates the loading of data. If you need to load additional data, use the *launch()* method.

pageUnloadComplete()

Provides extension of the logic that is executed at the page unload and closure.

Page navigation

The *Terrasoft.PageNavigator* class manages the life cycle of the pages. The class enables opening and closing of the pages, updating of the irrelevant data and storing the page history.

forward(openingPageConfig)

Method opens page according to the properties of the *openingPageConfig* configuration parameter object. Main properties of this object are listed in the Table 1.

Table 1. The *openingPageConfig* object properties

Property	Description
controllerName	Name of the controller class.
viewXType	View type according to xtype.
type	Page type from the *Terrasoft.core.enums.PageType* enumeration.
modelName	Name of the page model.
pageSchemaName	Name of the page schema in configuration.
isStartPage	Flag indicating that the page is a start page. If previously the pages have been opened, they will be closed.
isStartRecord	Flag indicating that the view/edit page should be the first after the list. If there are other opened pages after the list, they will be closed.
recordId	Id of the record of the page being opened.
detailConfig	Settings of the standard detail.

backward()

The method is closing the page.

markPreviousPagesAsDirty(operationConfig)

Method marks all previous pages as irrelevant. After returning to previous pages, the *refreshDirtyData()* method is called for each page. The method re-loads the data or updates the data basing on the *operationConfig* object.

refreshPreviousPages(operationConfig, currentPageHistoryItem)

Method re-loads data for all previous pages and updates the data basing on the *operationConfig* object. If the value is set for the *currentPageHistoryItem* parameter, the method performs the same actions for the previous pages.

refreshAllPages(operationConfig, excludedPageHistoryItems)

Method re-loads data for all pages or updates the data basing on the *operationConfig* object. If the *excludedPageHistoryItems* parameter is set, the method does not update the specified pages.

Navigation with routes

Routing

Routing is used for managing visual components: pages, pickers, etc. The route has 3 states:

1. *Load* – opens a current route.

2. *Unload* – closes current route on return.

3. *Reload* – restores the previous route on return.

The *Terrasoft.Router* class is used for routing and it's main methods are *add()*, *route()* and *back()*.

add(name, config)

Adds a route. Parameters:

- *name* – Unique name of the route. In case of re-adding, the latest route will override the previous one.
- *config* – describes names of the functions that handle route states. Handlers of the route states are set in the *handlers* property.

Use case:

```
Terrasoft.Router.add("record", {
  handlers: {
     load: "loadPage",
     reload: "reloadPage",
     unload: "unloadLastPage"
  }
});
```

route(name, scope, args, config)

Starts the route. Parameters:

- *name* – name of the route.
- *scope* – context of the function of the state handlers.
- *args* – parameters of the functions of the state handlers.
- *aonfig* – additional route parameters.

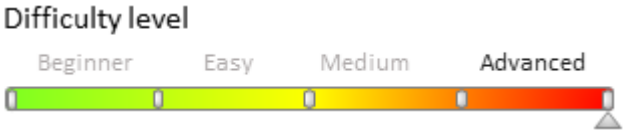
Use case:

```
var mainPageController = Terrasoft.util.getMainController();
Terrasoft.Router.route("record", mainPageController, [{pageSchemaName:
"MobileActivityGridPage"}]);
```

back()

Closes current route and restores previous.

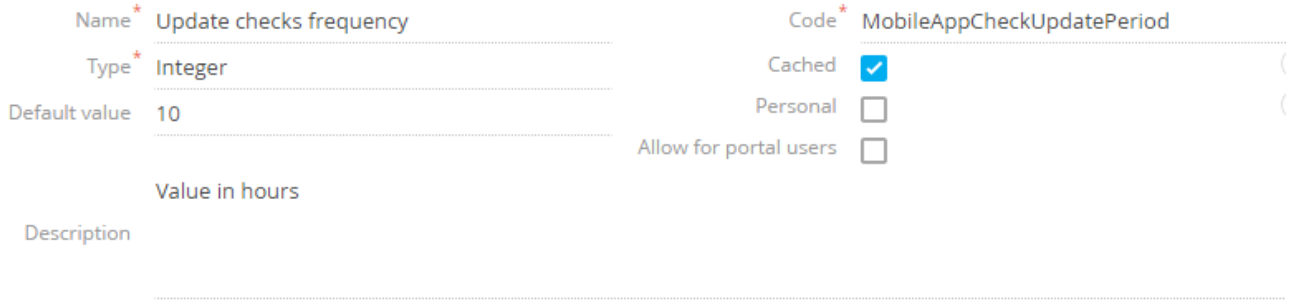
Mobile application background update



Introduction

The Mobile Creatio application implements a synchronization mechanism for the application structure, which can work automatically in the background. Use the [Update checks frequency] system setting to manage the automatic synchronization process.

Fig. 1. The [Update checks frequency] system setting



The frequency is specified as a time interval between automatic configuration updates initiated by the mobile app. The interval is specified in hours. If the setting is set to “0”, the application will always download configuration updates.

Working conditions

The application starts the background synchronization only if the following conditions are met:

- the mobile device uses the iOS or Android platform
- synchronization has not started yet
- the time between synchronizations (specified in the [Update checks frequency] system setting) has elapsed
- the application is launched, or the application is activated (i.e. it was previously minimized).

If changes were made during the structure update, the application will automatically restart to apply the changes when the user minimizes it or switches to another application.

Platform specifics

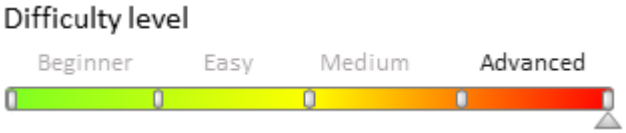
1. The background mode is implemented through a parallel running service on the Android platform. This approach ensures that the running synchronization will be completed even if the user manually closes the application.
2. On the iOS platform, the application works in the main *webView* while the synchronization uses the second *webView*. This ensures that the user can continue working with the application while the structure synchronization is in progress.

   Unlike the Android platform, the synchronization can be interrupted when the application is closed manually or if the iOS platform closes the app itself.

3. On the Windows 10 platform, the application checks for updates on the server at startup. There is no background update check.

   If updates are available, a page with the relevant information is displayed.

Getting the settings and data from the [Dashboards] section



Introduction

Getting the settings and the dashboards data is implemented in the *AnalyticsService* service and in the *AnalyticsServiceUtils* utility in the *Platform* package.

AnalyticsService

Class that implements the *AnalyticsService* service conteins following public methods:

- *public Stream GetDashboardViewConfig(Guid id)* – returns the settings of a view and widgets on the dashboards tab by the dashboard page Id.
- *public Stream GetDashboardData(Guid id, int timeZoneOffset)* – returns the data from all widgets on the dashboards tab by the dashboard page Id.
- *public Stream GetDashboardItemData(Guid dashboardId, string itemName, int timeZoneOffset)* – returns data from athe specific widget by the dashboard page Id and the widget name.

timeZoneOffset {int} – the time zone offset (in minutes) from the UTC. Dashboards data will be received using this time zone.

An example of the requests to the AnalyticsService service

HEADERS

```
Accept:application/json
```

The GetDashboardViewConfig() method

URL

```
POST /0/rest/AnalyticsService/GetDashboardViewConfig
```

The content of the request

```
{
    "id": "a71d5c04-dff7-4892-90e5-9e7cc2246915"
}
```

The content of the response

```
{
  "items": [
    {
      "layout": {
        "column": 0,
        "row": 0,
        "colSpan": 12,
        "rowSpan": 5
      },
      "name": "Chart4",
```

```
      "itemType": 4,
      "widgetType": "Chart"
    }
  ]
}
```

The GetDashboardData() method

URL

```
POST /0/rest/AnalyticsService/GetDashboardData
```

The content of the request

```
{
    "id": "a71d5c04-dff7-4892-90e5-9e7cc2246915",
    "timeZoneOffset": 120
}
```

The content of the response

```
{
    "items": [
        {
            "name": "Indicator1",
            "caption": "Average time for activity",
            "widgetType": "Indicator",
            "style": "widget-green",
            "data": 2
        }
    ]
}
```

The GetDashboardItemData() method

URL

```
POST /0/rest/AnalyticsService/GetDashboardItemData
```

The content of the request

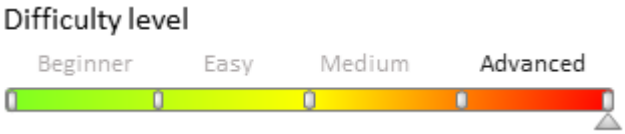
```
{
    "dashboardId": "a71d5c04-dff7-4892-90e5-9e7cc2246915",
    "itemName": "Chart4",
    "timeZoneOffset": 120
}
```

The content of the response

```
{
  "name": "Chart4",
  "caption": "Invoice payment dynamics",
  "widgetType": "Chart",
  "chartConfig": {
    "xAxisDefaultCaption": null,
    "yAxisDefaultCaption": null,
    "seriesConfig": [
      {
        "type": "column",
        "style": "widget-green",
```

```
        "xAxis": {
          "caption": null,
          "dateTimeFormat": "Month;Year"
        },
        "yAxis": {
          "caption": "Actually paid",
          "dataValueType": 6
        },
        "schemaName": "Invoice",
        "schemaCaption": "Invoice",
        "useEmptyValue": null
      }
    ],
    "orderDirection": "asc"
  },
  "style": "widget-green",
  "data": []
}
```

Resolving synchronization conflicts automatically



Introduction

During the synchronization of a mobile app working in the offline mode, the transferred data sometimes cannot be saved. This happens if:

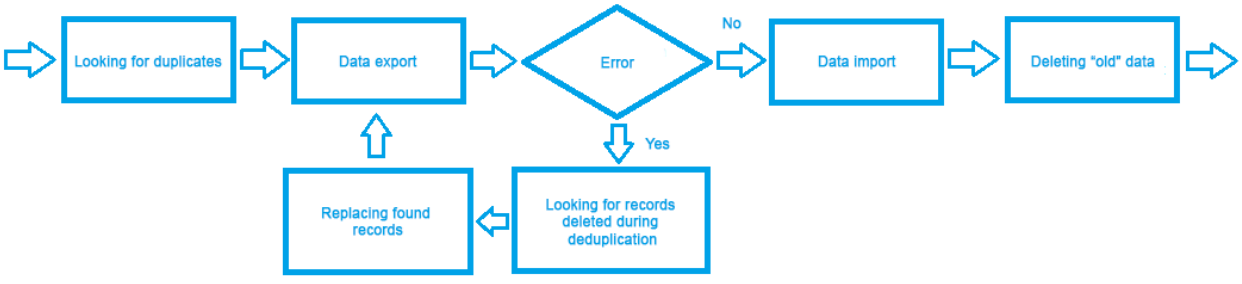
- A record was merged with a duplicate, and therefore does not exist.
- A record was deleted.

The mobile application processes both cases automatically.

Record merged with a duplicate

The algorithm of resolving synchronization conflicts caused by duplicate merging is shown in Fig. 1:

Fig. 1. Resolving a conflict of merged duplicates



The application first checks the records that have been merged since the last synchronization. Namely, what records were deleted and which records replaced them. If there were no errors during export, the import is performed. If the Foreign Key Exception or the Item Not Found Exception errors occur, the following steps are taken to resolve the conflict:

- The system checks for columns with the “old” record.
- The “old” record will be replaced with a new record which includes the merged data.

The record is sent to Creatio afterwards. When the import is finished and the information on merged duplicates is

found, the “old” records are deleted locally.

Record not found

If the server returns a “Record not found” error, the application performs the following actions:

1. The application first checks the records that have been deleted when merged with another record (see: “Record merged with a duplicate”).
2. If there is no deleted record in the list, the application deletes it locally.
3. The application deletes the record information from the synchronization log.

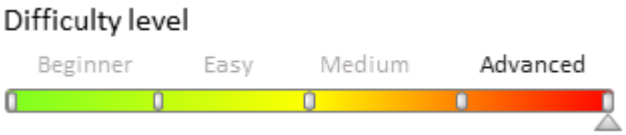
After this, the application considers this conflict as resolved and continues to export data.

Mobile SDK

List SDK

Classes, methods and properties of the Mobile Creatio application list.

List SDK



ATTENTION

This article is relevant for mobile application version 7.11.1 or higher.

Introduction

List SDK is a tool that enables to configure list layout, sorting, search logic, etc. It is implemented on the *Terrasoft.sdk.GridPage*.

Terrasoft.sdk.GridPage methods

setPrimaryColumn()

Sets the primary display column. Configures the displaying of a title of the list record.

Method signature

setPrimaryColumn(modelName, column)

Parameters

modelName – model name.

Column – column name.

Example of call

```
Terrasoft.sdk.GridPage.setPrimaryColumn("Case", "Subject");
```

setSubtitleColumns()

Sets the columns displayed under the title. Sets the subtitle display as a list of columns with a separator.

Method signature

setSubtitleColumns(modelName, columns)

Parameters

modelName – model name.

columns – an array of columns or column configuration objects.

Example of call

Option 1

```
Terrasoft.sdk.GridPage.setSubtitleColumns("Case", ["RegisteredOn","Number"]);
```

Option 2

```
Terrasoft.sdk.GridPage.setSubtitleColumns("Case", ["RegisteredOn", { name: "Number",
convertFunction: function(values) { return values.Number; } }]);
```

setGroupColumns()

Sets a group with columns that are displayed vertically. Configures displaying the group of columns.

Method signature

setGroupColumns(modelName, columns)

Parameters

modelName – model name.

columns – an array of columns or column configuration objects.

Example of call

Option 1

```
Terrasoft.sdk.GridPage.setGroupColumns("Case", ["Symptoms"])
```

Option 2

```
Terrasoft.sdk.GridPage.setGroupColumns("Case", [
{
name: "Symptoms",
isMultiline: true,//Display as multi-line field
label: "CaseGridSymptomsColumnLabel",//Name of the localized string
convertFunction: function(values) {
return values.Symptoms;
}
}]);
```

setImageColumn()

Sets the image column.

setOrderByColumns()

Sets the list sorting.

setSearchColumn()

Sets the search column.

setSearchColumns()

Sets the search columns.

setSearchPlaceholder()

Sets the hint text in the search field.

setTitle()

Sets the title of the list page.

Example

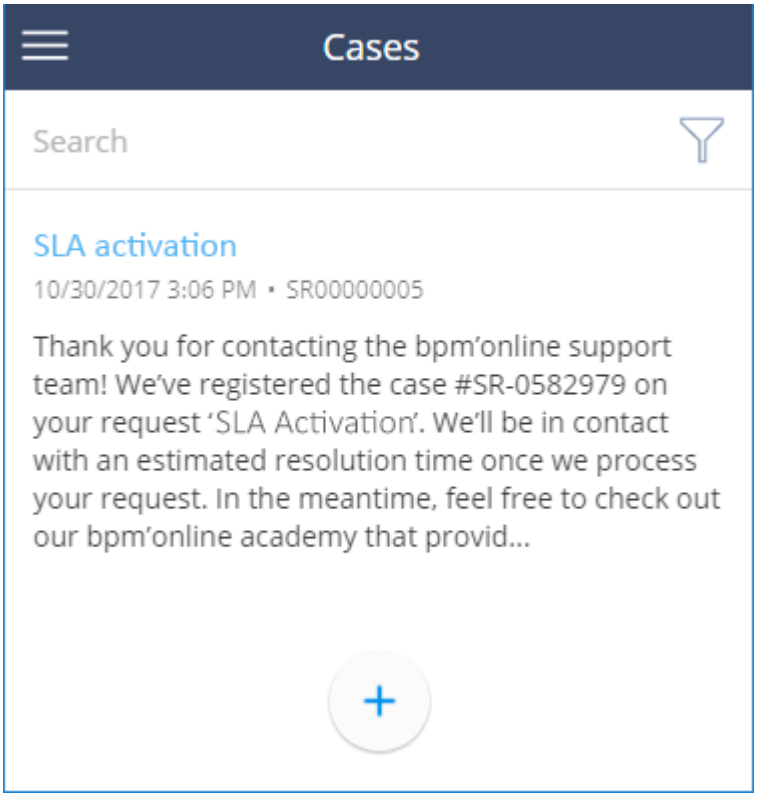
Configure the [Cases] section list to display the title with the case subject, subtitle with the registration date and case number and the case description as the multi-line field.

Use the following source code to configure the list:

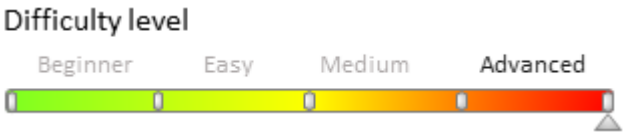
```
// Configure the primary column with the case subject.
Terrasoft.sdk.GridPage.setPrimaryColumn("Case", "Subject");
// Setting the subtitle with the registration date and the case number.
Terrasoft.sdk.GridPage.setSubtitleColumns("Case", ["RegisteredOn","Number"]);
// Adding a multi-line field with the description.
Terrasoft.sdk.GridPage.setGroupColumns("Case", [
{
name: "Symptoms",
isMultiline: true
}]);
```

As a result, the list will be displayed as shown on Fig. 1.

Fig. 1. Configured list of cases



Business rules in mobile application



Introduction

Business rules represent a Creatio mechanism that enables setting up the behavior of record edit page fields. You can use business rules to, e.g., set up visible or required fields, make fields enabled, etc.

ATTENTION

Business rules work only on record edit and view pages.

Adding business rules to a page is performed via the *Terrasoft.sdk.Model.addBusinessRule(name, config)* method, where

- *name* – is the name of the model, bound to the edit page, e.g., "Contact".
- *config* – is the object defining business rule properties. The list of properties depends on a specific business rule type.

The base business rule

The base business rule is an abstract class, i.e., all business rules should be its inheritors.

The properties of the *config* configuration object that can be used by the inheritors of the business rule:

- *ruleType* – the type of rule. The value must be included into the *Terrasoft.RuleTypes* enumeration.
- *triggeredByColumns* – the column array that triggers the rule.
- *message* – a text message displayed under the control element connected with the column in case business rule is not executed. It is necessary for rules that inform a user of warnings.

- *name* – a unique name of a business rule. It is necessary if you need to delete a rule by the *Terrasoft.sdk* methods.
- *position* – a position of a business rule that defines its order priority in the current queue.
- *events* – an event array, defining the time of running business rules. It should contain values included into the *Terrasoft.BusinessRuleEvents* enumeration.

The *Terrasoft.BusinessRuleEvents* enumeration contains the following values:

- *Terrasoft.BusinessRuleEvents.Save* – the rule is executed before saving the data.
- *Terrasoft.BusinessRuleEvents.ValueChanged* – the rule is executed when the data is modified (while editing).
- *Terrasoft.BusinessRuleEvents.Load* – the rule is executed when the edit page is opened.

The [Is required] business rule (Terrasoft.RuleTypes.Requirement)

Defines whether an edit page field is required. Values of the *config* configuration object that are used:

- *ruleType* – should contain the *Terrasoft.RuleTypes.Requirement* value for this rule.
- *requireType* – verification type. The value must be included into the *Terrasoft.RequirementTypes* enumeration. The rule can verify one or all the columns from *triggeredByColumns*.
- *triggeredByColumns* – the column array that triggers the rule. If the verification type equals *Terrasoft.RequirementTypes.Simple*, one column in the array should be specified.

The *Terrasoft.RequirementTypes* enumeration contains the following values:

- *Terrasoft.RequirementTypes.Simple* – value verification in one column.
- Terrasoft.RequirementTypes.OneOf – one of the columns specified in the triggeredByColumns should be populated.

Use case

```
Terrasoft.sdk.Model.addBusinessRule("Contact", {
    ruleType: Terrasoft.RuleTypes.Requirement,
    requireType : Terrasoft.RequirementTypes.OneOf,
    events: [Terrasoft.BusinessRuleEvents.Save],
    triggeredByColumns: ["HomeNumber", "BusinessNumber"],
    columnNames: ["HomeNumber", "BusinessNumber"]
});
```

The [Visibility] business rule (Terrasoft.RuleTypes.Visibility)

You can hide and display fields per condition using this rule. Values of the *config* configuration object that are used:

- *ruleType* – should contain the *Terrasoft.RuleTypes.Visibility* value for this rule.
- *triggeredByColumns* – the column array that triggers the rule.
- *events* – an event array, defining the time of running business rules. It should contain values included into the *Terrasoft.BusinessRuleEvents* enumeration.
- *conditionalColumns* – condition array of business rule execution. Usually, these are specific column values.
- *dependentColumnNames* – column name array that the business rule is applied to.

Use case

```
Terrasoft.sdk.Model.addBusinessRule("Account", {
    ruleType: Terrasoft.RuleTypes.Visibility,
    conditionalColumns: [
        {name: "Type", value: Terrasoft.Configuration.Consts.AccountTypePharmacy}
    ],
    triggeredByColumns: ["Type"],
    dependentColumnNames: ["IsRx", "IsOTC"]
});
```

The fields connected with the IsRx and IsOTC columns are displayed if the Type column contains the value defined

by the Terrasoft.Configuration.Consts.AccountTypePharmacy invariable.

```
Terrasoft.Configuration.Consts = {
    AccountTypePharmacy: "d12dc11d-8c74-46b7-9198-5a4385428f9a"
};
```

You can use the 'd12dc11d-8c74-46b7-9198-5a4385428f9a' value instead of the invariable.

The [Enabled/Disabled] business rule (Terrasoft.RuleTypes.Activation)

This business rule enables and disables fields for entering values per condition. Values of the *config* configuration object that are used:

- *ruleType* – should contain the *Terrasoft.RuleTypes.Activation* value for this rule.
- *triggeredByColumns* – the column array that triggers the rule.
- *events* – an event array, defining the time of running business rules. It should contain values included into the *Terrasoft.BusinessRuleEvents* enumeration.
- *conditionalColumns* – condition array of business rule execution. Usually, these are specific column values.
- *dependentColumnNames* – column name array that the business rule is applied to.

Use case

Whether a field connected with the *Stock* column is enabled depends on the value in the *IsPresence* column.

```
Terrasoft.sdk.Model.addBusinessRule("ActivitySKU", {
    ruleType: Terrasoft.RuleTypes.Activation,
    events: [Terrasoft.BusinessRuleEvents.Load,
Terrasoft.BusinessRuleEvents.ValueChanged],
    triggeredByColumns: ["IsPresence"],
    conditionalColumns: [
        {name: "IsPresence", value: true}
    ],
    dependentColumnNames: ["Stock"]
});
```

The [Filtration] business rule (Terrasoft.RuleTypes.Filtration)

This business rule can be used for filtration of lookup columns by condition, or by another column value. Values of the *config* configuration object that are used:

- *ruleType* – should contain the *Terrasoft.RuleTypes.Filtration* value for this rule.
- *triggeredByColumns* – the column array that triggers the rule.
- *events* – an event array, defining the time of running business rules. It should contain values included into the *Terrasoft.BusinessRuleEvents* enumeration.
- *Filters* – filter. The property should contain the *Terrasoft.Filter* class instance.
- *filteredColumn* – the column used for filtering values.

Use cases

Case of filtering per condition

When selecting a value in the [Product] lookup column, only the products containing the *true* value in the [Active] column of the [Product in invoice] detail are available.

```
Terrasoft.sdk.Model.addBusinessRule("InvoiceProduct", {
    ruleType: Terrasoft.RuleTypes.Filtration,
    events: [Terrasoft.BusinessRuleEvents.Load],
    triggeredByColumns: ["Product"],
    filters: Ext.create("Terrasoft.Filter", {
        modelName: "Product",
        property: "Active",
```

```
        value: true
    })
});
```

Case of filtering per other column value

The [Contact] field on the record edit page of the [Invoices] section should be filtered based on the [Account] field value.

```
Terrasoft.sdk.Model.addBusinessRule("Invoice", {
    ruleType: Terrasoft.RuleTypes.Filtration,
    events: [Terrasoft.BusinessRuleEvents.Load,
Terrasoft.BusinessRuleEvents.ValueChanged],
    triggeredByColumns: ["Account"],
    filteredColumn: "Contact",
    filters: Ext.create("Terrasoft.Filter", {
        property: "Account"
    })
});
```

The [Mutual Filtration] business rule (Terrasoft.RuleTypes.MutualFiltration)

This business rule enables mutual filtering of two lookup fields. Works only with columns with the “one-to-many” relationship, e.g., [Country] – [City]. Create a separate business rule for every field cluster. For example, for the [Country] – [Region] – [City] and the [Country] – [City] clusters, create three business rules:

- [Country] – [Region];
- [Region] – [City];
- [Country] – [City].

Values of the *config* configuration object that are used:

- *ruleType* – should contain the *Terrasoft.RuleTypes.MutualFiltration* value for this rule.
- *triggeredByColumns* – the column array that triggers the rule.
- *Connections* – object array that configures cluster relationship.

Use cases

Mutual filtration of the [Country], [Region] and [City] fields.

```
Terrasoft.sdk.Model.addBusinessRule("ContactAddress", {
    ruleType: Terrasoft.RuleTypes.MutualFiltration,
    triggeredByColumns: ["City", "Region", "Country"],
    connections: [
        {
            parent: "Country",
            child: "City"
        },
        {
            parent: "Country",
            child: "Region"
        },
        {
            parent: "Region",
            child: "City"
        }
    ]
});
```

Mutual filtration of the [Contact], [Account] fields.

```
Terrasoft.sdk.Model.addBusinessRule("Activity", {
```

```
    ruleType: Terrasoft.RuleTypes.MutualFiltration,
    triggeredByColumns: ["Contact", "Account"],
    connections: [
        {
            parent: "Contact",
            child: "Account",
            connectedBy: "PrimaryContact"
        }
    ]
});
```

The [Regular expression] business rule (Terrasoft.RuleTypes.RegExp)

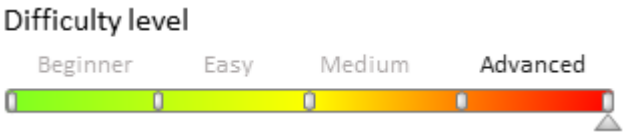
Verifies the conformity of the column value with the regular expression. Values of the *config* configuration object that are used:

- *ruleType* – should contain the *Terrasoft.RuleTypes.RegExp* value for this rule.
- *RegExp* – regular expression whose conformity with all the *triggeredByColumns* array columns is verified.
- triggeredByColumns – the column array that triggers the rule.

Use case

```
Terrasoft.sdk.Model.addBusinessRule("Contact", {
    ruleType: Terrasoft.RuleTypes.RegExp,
    regExp : /^([0-9\(\)\/\+ \-]*)$/
    triggeredByColumns: ["HomeNumber", "BusinessNumber"]
});
```

Custom business rules of the mobile application



Introduction

Business rules are a standard Creatio mechanism that enables you to set up the page field behavior on the record edit page. You can set if the field is visible, required/optional, available for editing and filtering the values. More information about business rules can be found in the “**Business rules in mobile application**” article.

In the mobile application you can add business rule that implements custom logic (custom business rule). The *Terrasoft.RuleTypes.Custom* method is provided for this type of business rules.

Properties of the *config* configuration object

When adding a custom business rule via the *Terrasoft.sdk.Model.addBusinessRule(name, config)* method you can use properties of the *config* configuration object of the base business rule (“**Business rules in mobile application**”). In addition, the *executeFn* property is also provided.

Properties used in the config configuration object:

- *ruleType* – rule type. For the custom rules it should contain the *Terrasoft.RuleTypes.Custom* value.
- *triggeredByColumns* – array of columns which initiates trigging of the business rule.
- *events* – array of events determining the start time of the business rule. It should contain values from the *Terrasoft.BusinessRuleEvents* enumeration. Default value: *Terrasoft.BusinessRuleEvents.ValueChanged*.
- *executeFn* – a handler function that contains the user logic for executing the business rule.

The *Terrasoft.BusinessRuleEvents* enumeration contains following values:

- *Terrasoft.BusinessRuleEvents.Save* – the rule trigs before saving the data.
- *Terrasoft.BusinessRuleEvents.ValueChanged* – the rule trigs after changing the data (at modification).

- *Terrasoft.BusinessRuleEvents.Load* – the rule trigs when the edit page is opened.

Properties of the executeFn handler function

The handler function declared in the *executeFn* property should have the following structure:

```
executeFn: function(record, rule, checkColumnName, customData, callbackConfig, event)
{
}
```

Function parameters:

- *record* – a record for which the business rule is executed.
- *rule* – an instance of the current business rule.
- *checkColumnName* – the name of the column that triggered the business rule.
- *customData* – an object that is shared between all rules. Not used. Left for compatibility with previous versions.
- *callbackConfig* – a configuration object of the *Ext.callback* asynchronous callback.
- *event* – an event that triggered the business rule.

After the completion of function operation it is necessary to call either the *callbackConfig.success* or *callbackConfig.failure*. The following call options are recommended:

```
Ext.callback(callbackConfig.success, callbackConfig.scope, [result]);
Ext.callback(callbackConfig.failure, callbackConfig.scope, [exception]);
```

Where:

- *result* – the returned boolean value obtained when the function is executed (*true/false*).
- *Exception* – the exception of the *Terrasoft.Exception* type, which occurred in the handler function.

In the source code of the handler function, you can use the following methods of the model passed in the *record* parameter:

- *get(columnName)* – to get the value of a record column. The *columnName* argument should contain the column name.
- *set(columnName, value, fireEventConfig)* – to set the value of the record column. Parameters:
  - *columnName* – the name of the column.
  - *value* – the value assigned to the column.
  - *fireEventConfig* – a configuration object to set the properties that are passed to the column modification event.
- *changeProperty(columnName, propertyConfig)* – for changing column properties except its value. The *columnName* argument should contain the column name and the *propertyConfig* object that sets the column properties. Possible properties of the *propertyConfig* object:
  - *disabled* – activity of the column. If *true*, the control associated with the column will be inactive and disabled for operation.
  - *readOnly* – “read only” flag. If *true*, the control associated with the column will be available only for reading. If *false* – the access for reading and writing.
  - *hidden* – column visibility. If *true*, the control associated with the column will be hidden. If *false* – the control will be displayed.
  - *addFilter* – add filter. If the property is specified, it should have a filter of the *Terrasoft.Filter* type that will be added to the column filtration. Property is used only for lookup fields.
  - *removeFilter* – remove the filter. If the property is specified, it should have a name of the filter that will be removed from the column filtration. Property is used only for lookup fields.
  - *isValid* – flag of column validity. If the property is specified, it will change the validity flag of the control associated with the column. If the column is invalid, then this can mean canceling of saving the record, and can also lead to the determining the record as invalid.

For example, for changing the properties (but not the values) of the “Owner” column:

```
record.changeProperty("Owner", {
    disabled: false,
```

```
    readOnly: false,
    hidden: false,
    addFilter: {
        property: "IsChief",
        value: true
    },
    isValid: {
        value: false,
        message: LocalizableStrings["Owner_should_be_a_chief_only"]
    }
});
```

Examples of the custom business rule

Example 1

Highlight the field with the result of the activity, if its status is “Completed”, the [result] field is not filled and the *ProcessElementId* column has a value.

```
// Rule for the activity edit page.
Terrasoft.sdk.Model.addBusinessRule("Activity", {
    // The name of the business rule.
    name: "ActivityResultRequiredByStatusFinishedAndProcessElementId",
    // Business rule type: custom.
    ruleType: Terrasoft.RuleTypes.Custom,
    //The rule is initiated by the Status and Result columns.
    triggeredByColumns: ["Status", "Result"],
    // The rule will work before saving the data and after changing the data.
    events: [Terrasoft.BusinessRuleEvents.ValueChanged,
Terrasoft.BusinessRuleEvents.Save],
    // Handler function.
    executeFn: function(record, rule, column, customData, callbackConfig) {
        // A flag of the validity of the property and the rule.
        var isValid = true;
        // The value of the ProcessElementId column.
        var processElementId = record.get("ProcessElementId");
        // If the value is not empty.
        if (processElementId && processElementId !== Terrasoft.GUID_EMPTY) {
            // Set the validity flag.
            isValid = !(record.get("Status.Id") ===
Terrasoft.Configuration.ActivityStatus.Finished &&
                Ext.isEmpty(record.get("Result")));
        }
        // Change the properties of the Result column.
        record.changeProperty("Result", {
            // Set the column correctness indicator.
            isValid: {
                value: isValid,
                message: Terrasoft.LS["Sys.RequirementRule.message"]
            }
        });
        // Asynchronous return of values.
        Ext.callback(callbackConfig.success, callbackConfig.scope, [isValid]);
    }
});
```

Example 2

Adding and deleting filtration by a custom logic.

```
Terrasoft.sdk.Model.addBusinessRule("Activity", {
    name: "ActivityResultByAllowedResultFilterRule",
```

```
    position: 1,
    ruleType: Terrasoft.RuleTypes.Custom,
    triggeredByColumns: ["Result"],
    events: [Terrasoft.BusinessRuleEvents.ValueChanged,
Terrasoft.BusinessRuleEvents.Load],
    executeFn: function(record, rule, column, customData, callbackConfig) {
        var allowedResult = record.get("AllowedResult");
        var filterName = "ActivityResultByAllowedResultFilter";
        if (!Ext.isEmpty(allowedResult)) {
            var allowedResultIds =  Ext.JSON.decode(allowedResult, true);
            var resultIdsAreCorrect = true;
            for (var i = 0, ln = allowedResultIds.length; i < ln; i++) {
                var item = allowedResultIds[i];
                if (!Terrasoft.util.isGuid(item)) {
                    resultIdsAreCorrect = false;
                    break;
                }
            }
            if (resultIdsAreCorrect) {
                var filter = Ext.create("Terrasoft.Filter", {
                    name: filterName,
                    property: "Id",
                    funcType: Terrasoft.FilterFunctions.In,
                    funcArgs: allowedResultIds
                });
                record.changeProperty("Result", {
                    addFilter: filter
                });
            } else {
                record.changeProperty("Result", {
                    removeFilter: filterName
                });
            }
        } else {
            record.changeProperty("Result", {
                removeFilter: filterName
            });
        }
        Ext.callback(callbackConfig.success, callbackConfig.scope, [true]);
    }
});
```

Example 3

An example of the logic for dropping negative values to 0.

```
Terrasoft.sdk.Model.addBusinessRule("Opportunity", {
    name: "OpportunityAmountValidatorRule",
    ruleType: Terrasoft.RuleTypes.Custom,
    triggeredByColumns: ["Amount"],
    events: [Terrasoft.BusinessRuleEvents.ValueChanged,
Terrasoft.BusinessRuleEvents.Save],
    executeFn: function(model, rule, column, customData, callbackConfig) {
        var revenue = model.get("Amount");
        if ((revenue < 0) || Ext.isEmpty(revenue)) {
            model.set("Amount", 0, true);
        }
        Ext.callback(callbackConfig.success, callbackConfig.scope);
    }
});
```

Example 4

Example of generating the activity header for the FieldForce solution.

```
Terrasoft.sdk.Model.addBusinessRule("Activity", {
    name: "FieldForceActivityTitleRule",
    ruleType: Terrasoft.RuleTypes.Custom,
    triggeredByColumns: ["Account", "Type"],
    events: [Terrasoft.BusinessRuleEvents.ValueChanged,
Terrasoft.BusinessRuleEvents.Load],
    executeFn: function(record, rule, column, customData, callbackConfig, event) {
        if (event === Terrasoft.BusinessRuleEvents.ValueChanged || record.phantom) {
            var type = record.get("Type");
            var typeId = type ? type.get("Id") : null;
            if (typeId !== Terrasoft.Configuration.ActivityTypes.Visit) {
                Ext.callback(callbackConfig.success, callbackConfig.scope, [true]);
                return;
            }
            var account = record.get("Account");
            var accountName = (account) ? account.getPrimaryDisplayColumnValue() :
"";
            var title = Ext.String.format("{0}: {1}",
Terrasoft.LocalizableStrings.FieldForceTitlePrefix, accountName);
            record.set("Title", title, true);
        }
        Ext.callback(callbackConfig.success, callbackConfig.scope, [true]);
    }
});
```

Mobile Creatio development cases

Adding a standard detail to the section in mobile application

Use the Mobile application wizard to add a detail to the section of mobile application. If the detail object is not a section object of the Mobile Creatio application, the detail will display the id of the connected section record instead of record values. Configure the schema of the detail page to display values.

Access modificators of the page in the mobile application

The mobile application version 7.11.0 has the ability to configure access modificators of section or standard detail. For example, you can disable modifying, adding and deleting records for all users in the section.

Adding a custom widget to the mobile application

How to add a custom widget to the dashboards page of the mobile application.

Adding a standard detail to the section in mobile application

Introduction

Use the Mobile application wizard to add a detail to the section of mobile application. The setting up a detail via

mobile application wizard is described in the "How to set up a standard detail" article.

If the detail object is not a section object of the Mobile Creatio application, the detail will display the id of the connected section record instead of record values. Configure the schema of the detail page to display values.

Case description

Add the [Job experience] detail on the edit page of the [Contacts] section of mobile application. Display the [Job title] column as primary column.

Source code

You can download the package with case implementation using the following link.

Case implementation algorithm

1. Add the [Job experience] detail via the mobile application wizard

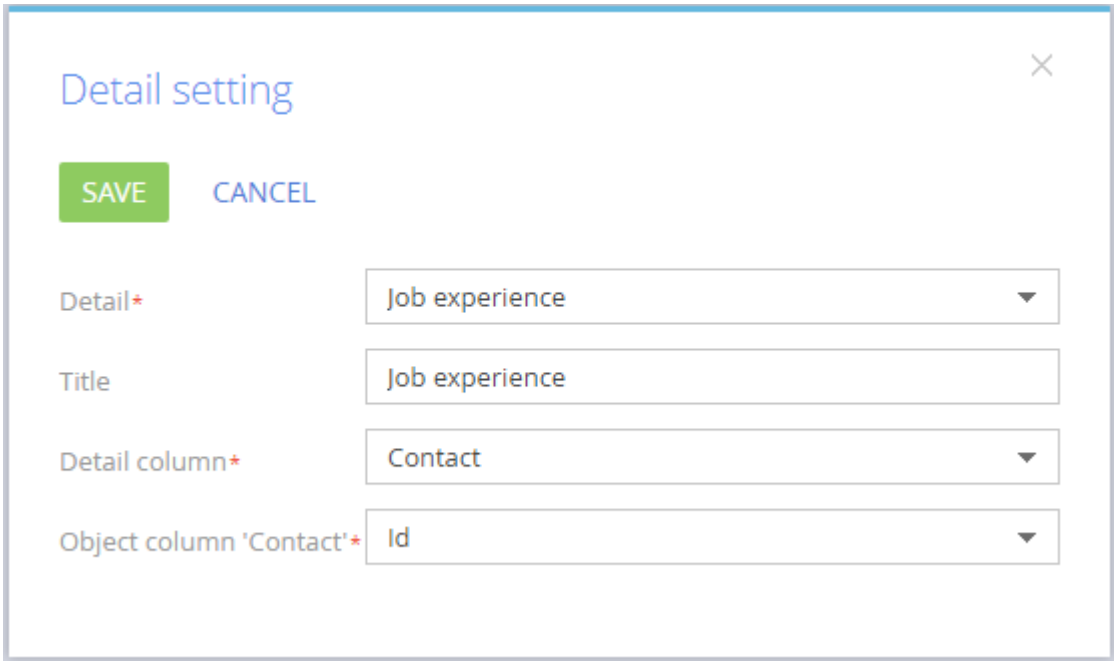
Use the mobile application wizard to add a detail on the record edit page. To do this:

1.1. Open the necessary workplace (for example [Main workplace]) and click the [Set up sections].

1.2. Select the [Contacts] section and click the [Details setup] button.

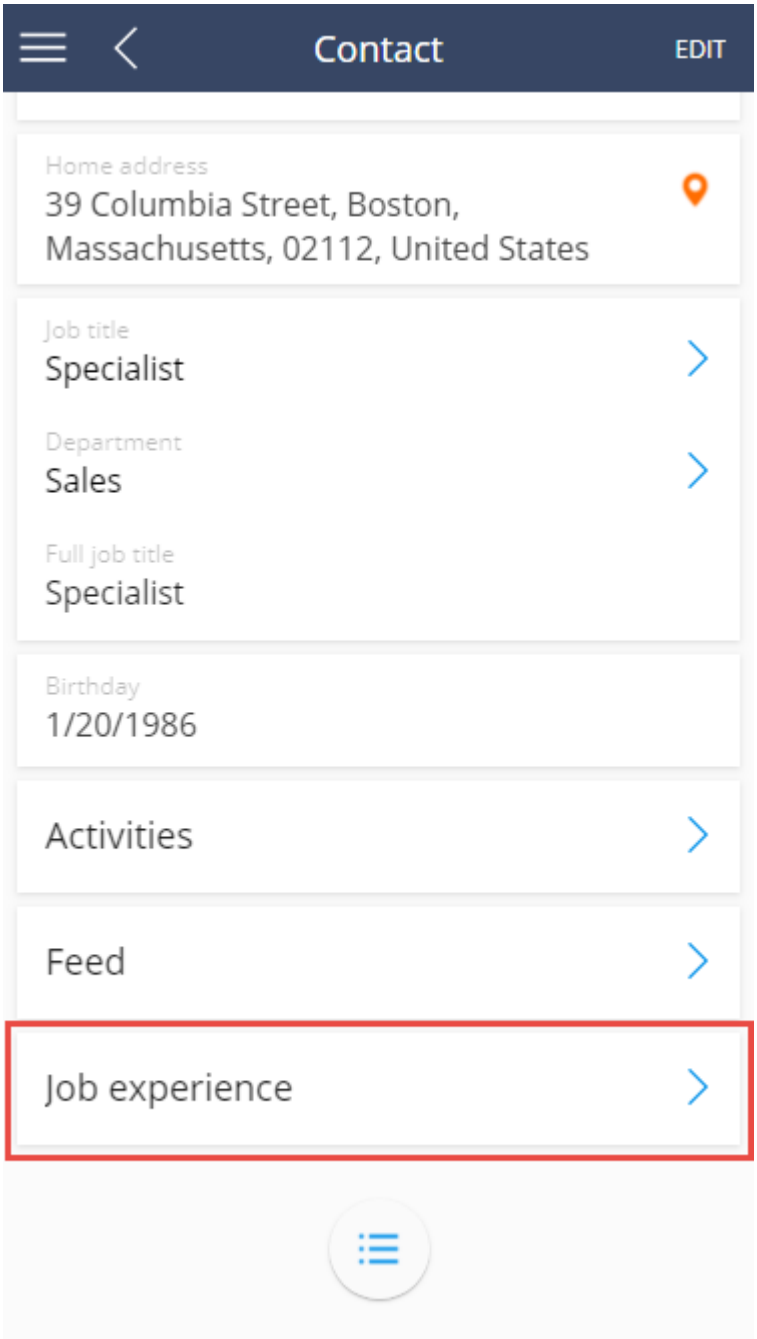
1.3. Set up the [Job experience] detail (Fig.1).

Fig. 1. Setting up the [Job experience] detail



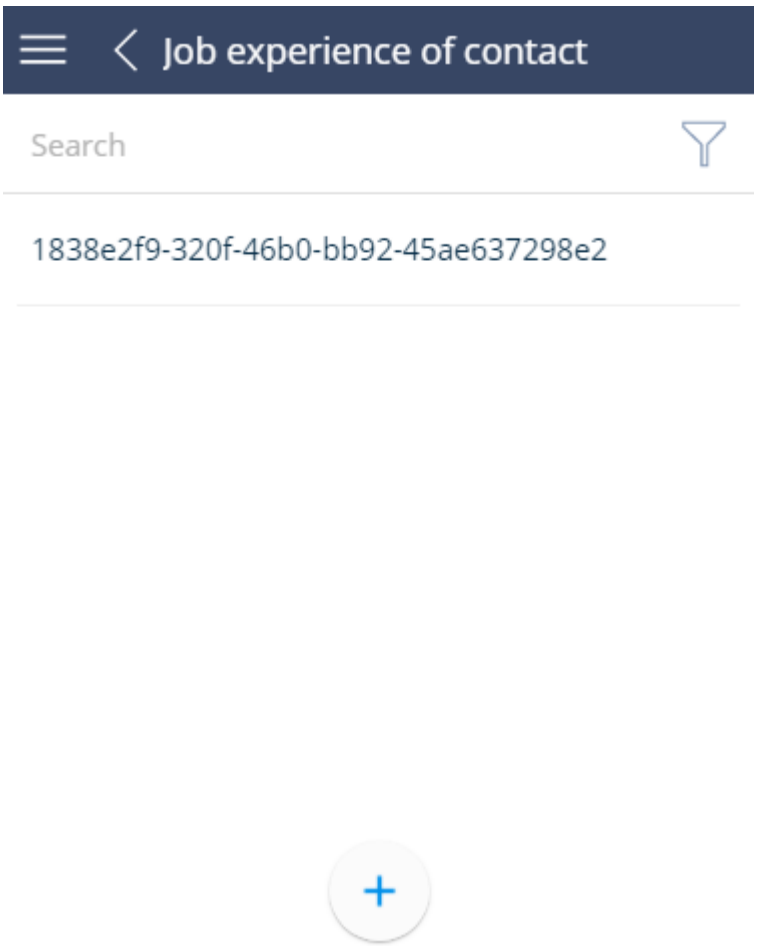
After saving the setup of detail, section and workplace, the [Job experience] detail will be displayed in the mobile application (Fig. 2).

Fig. 2. [Job experience] detail on the [Contacts] section record page



If the [Job experience] detail object is not a section object of the Mobile Creatio application, the detail will display the value of the [Contact] primary column (id of the connected record of the contact).

Fig. 3. Displaying id of the connected record of the contact

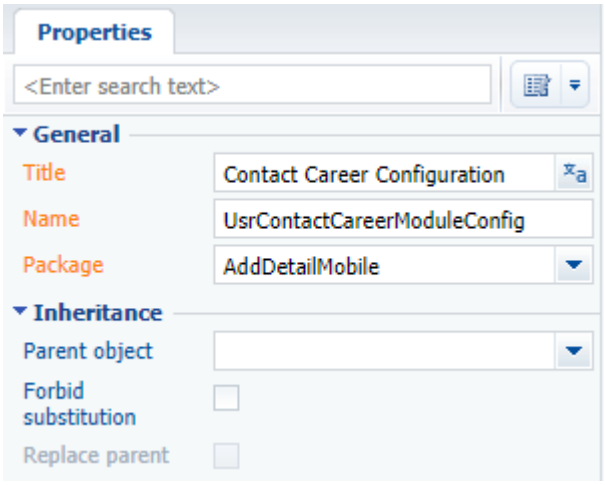


2. Create module schema in which to configure the detail list

Use the [Configuration] section to create custom module in the custom package with following properties (Fig. 4):

- [Title] – "Contact Career Configuration".
- [Name] – "UsrContactCareerModuleConfig".

Fig. 4. Properties of the module schema



Add the following source code to the module schema:

```
// Setting the [Job title] column as primary column.
Terrasoft.sdk.GridPage.setPrimaryColumn("ContactCareer", "JobTitle");
```

```
// Adding the [Job title] column to the primary column collection.
Terrasoft.sdk.RecordPage.addColumn("ContactCareer", {
        name: "JobTitle",
        position: 1
    }, "primaryColumnSet");
// Delete the [Contact] previous primary column  from the primary column collection.
Terrasoft.sdk.RecordPage.removeColumn("ContactCareer", "Contact",
"primaryColumnSet");
```

In this code:

- "ContactCareer" – name of the table that corresponds to the detail (as a rule it matches the name of the detail object).
- "Job Title" – name of the column that shoul be displayed on the page.

3. Connect the module schema in the mobile application manifest

To apply list settings performed in the *UsrContactCareerModuleConfig* module, perform following:

3.1. Open the schema of the mobile application manifest (*MobileApplicationManifestDefaultWorkplace*) in the custom module designer. This schema is created in the custom package by the mobile application wizard (see the "**How to add a custom section to a mobile application (on-line documentation)**" article).

3.2. Add the *UsrContactCareerModuleConfig* module to the *PagesExtensions* section of the *ContactCareer* model:

```
{
    "SyncOptions": {
        ...
    },
    "Modules": {},
    "Models": {
        "ContactCareer": {
            "RequiredModels": [
                ...
            ],
            "ModelExtensions": [],
            "PagesExtensions": [
                ...
                "UsrContactCareerModuleConfig"
            ]
        },
        ...
    }
}
```

3.3. Save the schema of the mobile application manifest

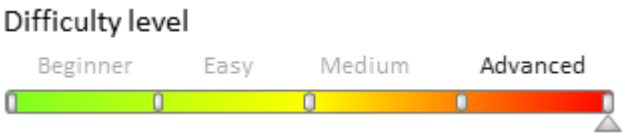
As a result, the [Job experience] detail will display records by the [Job title] column (Fig. 5).

Fig. 5. Case result

ATTENTION

To display the columns after set up clean the mobile application cache. You may need to compile the application using the corresponding action in the [Configuration] section.

Adding a custom widget to the mobile application



Introduction

The Mobile Creatio application supports dashboards since version 7.10.3 (version 7.10.5 of the mobile application). To receive settings and data for a dashboard, use the AnalyticsService service (see “**Getting the settings and data from the [Dashboards] section**”). The following widget types are supported: “Chart”, “Indicator”, “List” and “Gauge”.

To add a custom widget to the mobile application:

1. Implement a widget setup interface in the Creatio application.
2. Add the instance of the implemented custom widget to the application.
3. Configure the display of the widget in the mobile application.

ATTENTION

This article only describes the implementation of widget display in the mobile application.

To display a custom widget in the mobile application:

1. Implement the data receiving process of a custom widget.
2. Add the implementation of displaying the widget in the mobile application.

Case description

Add a custom widget to the dashboards page of the mobile application.

Case implementation algorithm

1. Implementation of the data receiving process of a custom widget

To receive data of each custom widget type, create a class that will implement the *IDashboardItemData* interface or will be inherited from the *BaseDashboardItemData* base class. To do this, the class must be decoded by the *DashboardItemData* attribute. To implement the class, add the [Source code] schema to the custom package.

The class implementation to the *CustomDashboardItem* custom widget type will be as follows:

```
namespace Terrasoft.Configuration
{
    using System;
    using Newtonsoft.Json.Linq;
    using Terrasoft.Core;

    // Attribute indicating the custom widget type.
    [DashboardItemData("CustomDashboardItem")]
    public class CustomDashboardItemData : BaseDashboardItemData
    {
        // Class constructor.
        public CustomDashboardItemData(string name, JObject config, UserConnection
userConnection, int timeZoneOffset)
            : base(name, config, userConnection, timeZoneOffset)
        {

        }
        // A method that returns the required data.
        public override JObject GetJson()
        {
            JObject itemObject = base.GetJson();
            itemObject["customValue"] = DateTime.Now.ToString();
            return itemObject;
        }
    }
}
```

2. Implementation of displaying a custom type of a widget.

2.1. Add a data displaying class

To do this, create a client module in a custom package (for example, UsrMobileCustomDashboardItem). In the created module, implement a class that extends the *Terrasoft.configuration.controls.BaseDashboardItem* base class.

```
Ext.define("Terrasoft.configuration.controls.CustomDashboardItem", {
    extend: "Terrasoft.configuration.controls.BaseDashboardItem",
    // Displays the value transferred through the customValue property.
    updateRawConfig: function(config) {
        this.innerHtmlElement.setHtml(config.customValue);
    }

});
```

2.2. Add a new type and a class that implements this type to the enumeration.

Add the following source code to the module created on a previous step:

```
Terrasoft.DashboardItemClassName.CustomDashboardItem =
"Terrasoft.configuration.controls.CustomDashboardItem";
```

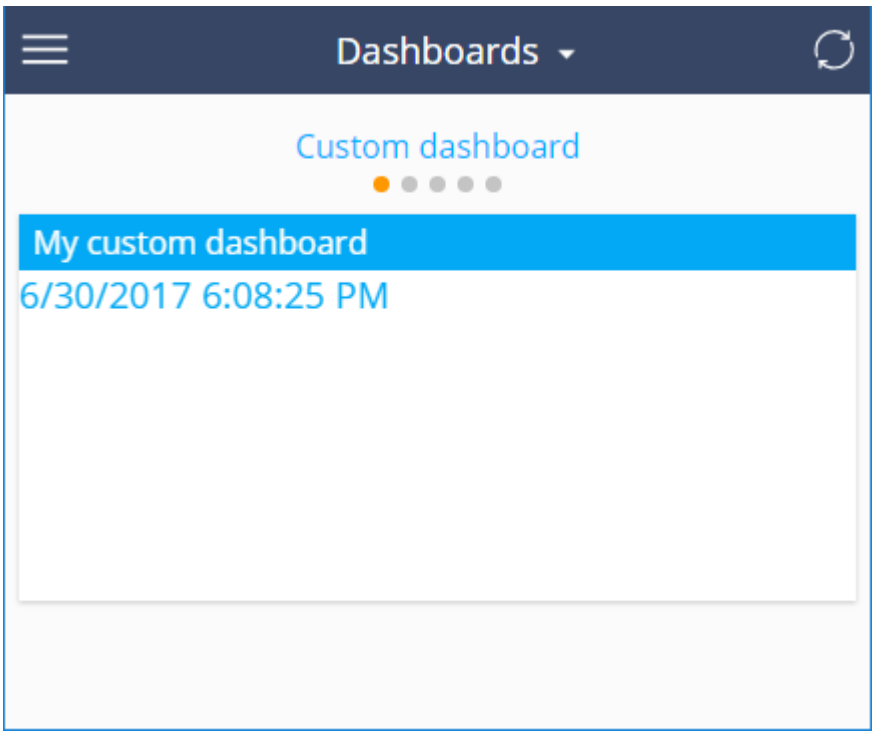
2.3. Add a name of a new custom schema to the mobile application manifest.

In the mobile application manifest file, add the name of the created module schema to the CustomSchemas array:

```
{
    "SyncOptions": {
        ...
    },
    "CustomSchemas": ["UsrMobileCustomDashboardItem"],
    "Modules": {...},
    "Models": {...}
}
```

After saving all changes, the widget will be displayed in the [Dashboars] section of the mobile application (Fig. 1).

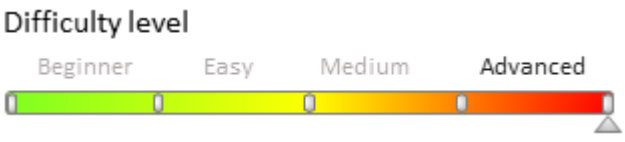
Fig. 1. Case result



ATTENTION

Add the dashboard widget to the main Creatio application. The mobile application will be synchronized with the main application and the widget will be displayed there.

Access modificators of the page in the mobile application



The mobile application version 7.11.0 or higher has the ability to configure access modificators of section or standard detail. For example, you can disable modifying, adding and deleting records for all users in the section.

To set the access in the read only mode, add the following code to the schema which name contains "ModuleConfig":

```
Terrasoft.sdk.Module.setChangeModes("UsrClaim", [Terrasoft.ChangeModes.Read]);
```

Or for the standard detail:

```
Terrasoft.sdk.Details.setChangeModes("UsrClaim", "StandardDetailName",
[Terrasoft.ChangeModes.Read]);
```

As a result the adding button will be disabled on the list page and the modifying button will be disabled on the view page. The [Add], [Delete], [Add record to the embedded detail], etc. buttons will be also disabled on the view page.

Access modificators could be combined. For example, the following code could be used to disable deleting and enable creating and modifying the records:

```
Terrasoft.sdk.Module.setChangeModes("UsrClaim", [Terrasoft.ChangeModes.Create,
Terrasoft.ChangeModes.Update]);
```

All access modificators are given in the *Terrasoft.ChangeModes* enumeration.