Dynamic Photo Gallery Specification

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1.0 SUMMARY

1.1 VISION

The overall vision of all projects which were designed and implemented for North Dakota Trade Office website was to improve company performance, and cooperation with customers. All projects requested for development were customer-oriented. The vision of Dynamic Photo Gallery is to increase customers' interest in the company business and attract more visitors to the company website.

The people (stakeholders) who were interested in implementation of projects for NDTO website were company employees and their customers.

1.2 GOALS (BUSINESS REQUIREMENTS)

The main goal of Dynamic Photo Gallery is to provide visual representation of company business so that customers could get more information about NDTO, how it does business for their customers, how it partners with customers, and organizes trips to foreign countries with different missions.

1.3 ASSUMPTIONS

Assumptions of the Dynamic Photo Gallery project:

- The Dynamic Photo Gallery can display thumbnail images with resolution equal to 130x130 pixels. The images in the zoomed mode have resolution equal to 600 x 600 pixels.
- Images of JPEG or GIF format only can be uploaded to the Dynamic Photo Gallery. Images of any other format are not recognized by the Dynamic Photo Gallery.
- Images of any size and resolution can be uploaded to the Dynamic Photo Gallery so that the system converts initial image resolutions into predefined sizes of 130x130 pixels and 600x600 pixels without losing image quality and proportions.

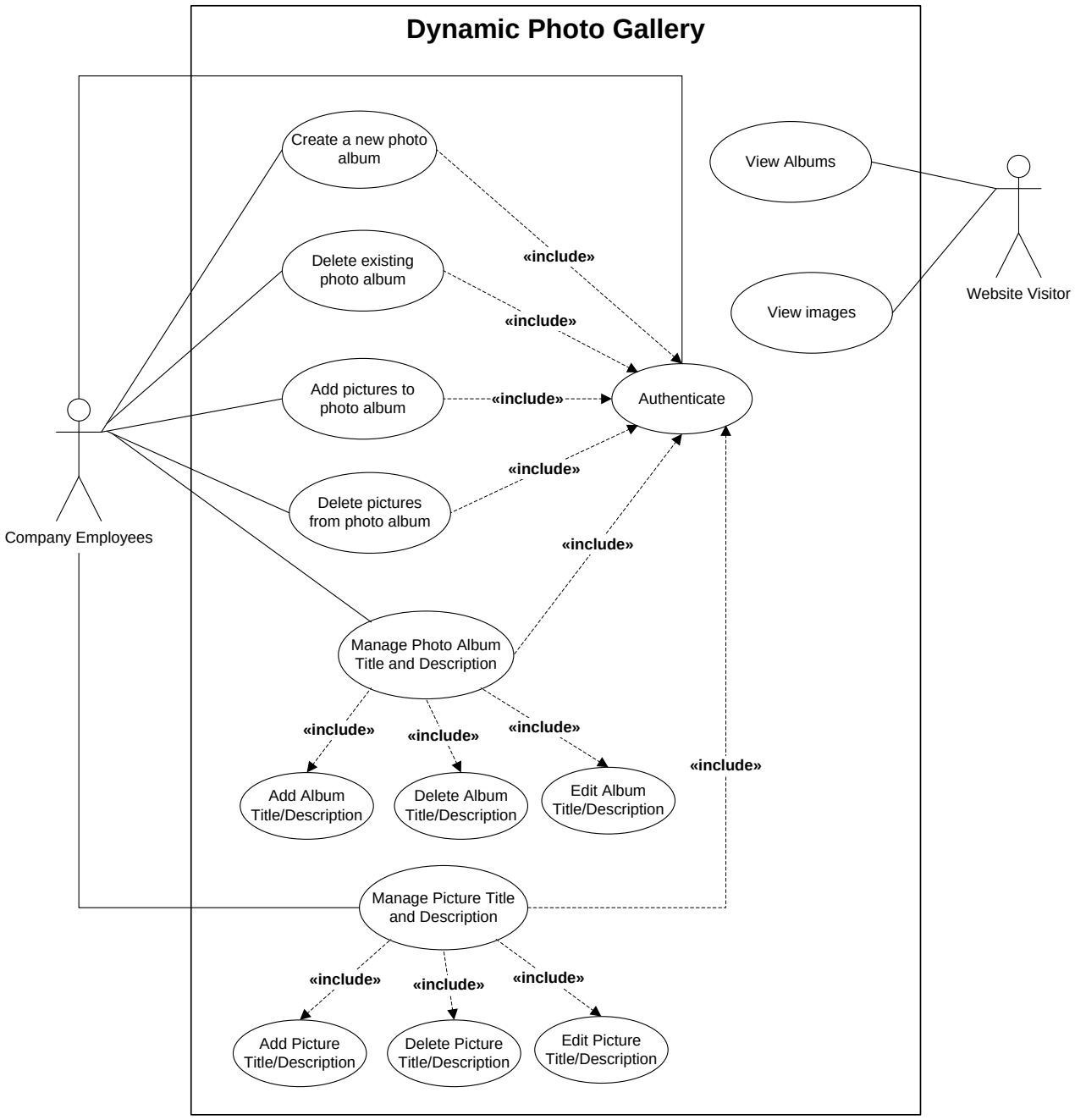
2.0 OVERALL DESCRIPTION

North Dakota Trade Office provides export services for North Dakota companies to export products to foreign markets. The company provides market research for their customers, finds new distributors, establish cooperation with foreign governments, host different events for international visitors, make promotions of domestic products and arrange trips to foreign countries to sign agreements with new partners. Since North Dakota Trade Office provides export services on the international level the company employees were especially interested to extend the functionality of the existing website that would help them in cooperation with their customers on the international level. The Dynamic Photo Gallery presented in this documentation was implemented in 2008.

The Dynamic Photo Gallery provided the following functionality:

- Authentication log in to the administration side of dynamic photo gallery;
- create new photo albums and delete existing ones;
- add and delete single and multiple pictures;
- add, edit and delete descriptions and titles for photo albums and pictures;
- selection of thumbnail photos for gallery previews

The Use Case Diagram "Dynamic Photo Gallery"



3.0 DATA REQUIREMENTS FOR DYNAMIC PHOTO GALLERY.

In order to upload any image to the Photo Gallery a company employee shall be authenticated through the logging page on the company website. After the company employee is authenticated he/she shall have ability to do different manipulations with photo gallery: create, delete photo albums; upload single or multiple images to the selected album; add, delete and updated the descriptions for photo albums and pictures. When the user creates a new photo album the Dynamic Photo Gallery automatically assigns unique ID number to every album and creates appropriate folders on a web server with album ID number. All this information is recorded in the company database. When a new image is uploaded to existing photo album the image is assigned unique ID number and it is saved to appropriate photo album folder on a web server according to the album ID number. All information about image such as image ID number, title and description are saved in the company database.

4.0 THE STRUCTURE OF DYNAMIC PHOTO GALLERY

The dynamic photo consists back-end and front-end sides. The back-end side of the system contains the classes that connects to the database and execute stored procedures to save, update and delete data in the database. All the data pulled from the database is returned by the backend classes as a list of objects.

The front-end side consists of the classes that deal with graphic user interface. All GUI functionality is executed by front-end classes and all the data pulled from the database is managed by the back-end classes.

The back-end side of Dynamic Photo Gallery includes the following classes:

- The class “Gallery” provides the functionality to add, update and delete galleries (photo albums) in the database. The class “Gallery” pulls photo albums from the database based on the gallery unique ID number. The list of galleries, pulled from the database, is saved as list of objects of the class Gallery.
- The class “Picture” provides the functionality to add, update and delete pictures in the database. Every time when a new picture is added to the gallery the class “Picture” calls appropriate stored procedure, assigns unique ID to the new picture and save picture ID, picture title and description to the database. The picture itself is saved on a web server in the folder that corresponds to gallery ID number.

The front-end classes of Dynamic Photo Gallery includes the front-end files: “Admingallery.aspx.cs”, “Photogallery.aspx.cs”, “Picture.aspx.cs”.

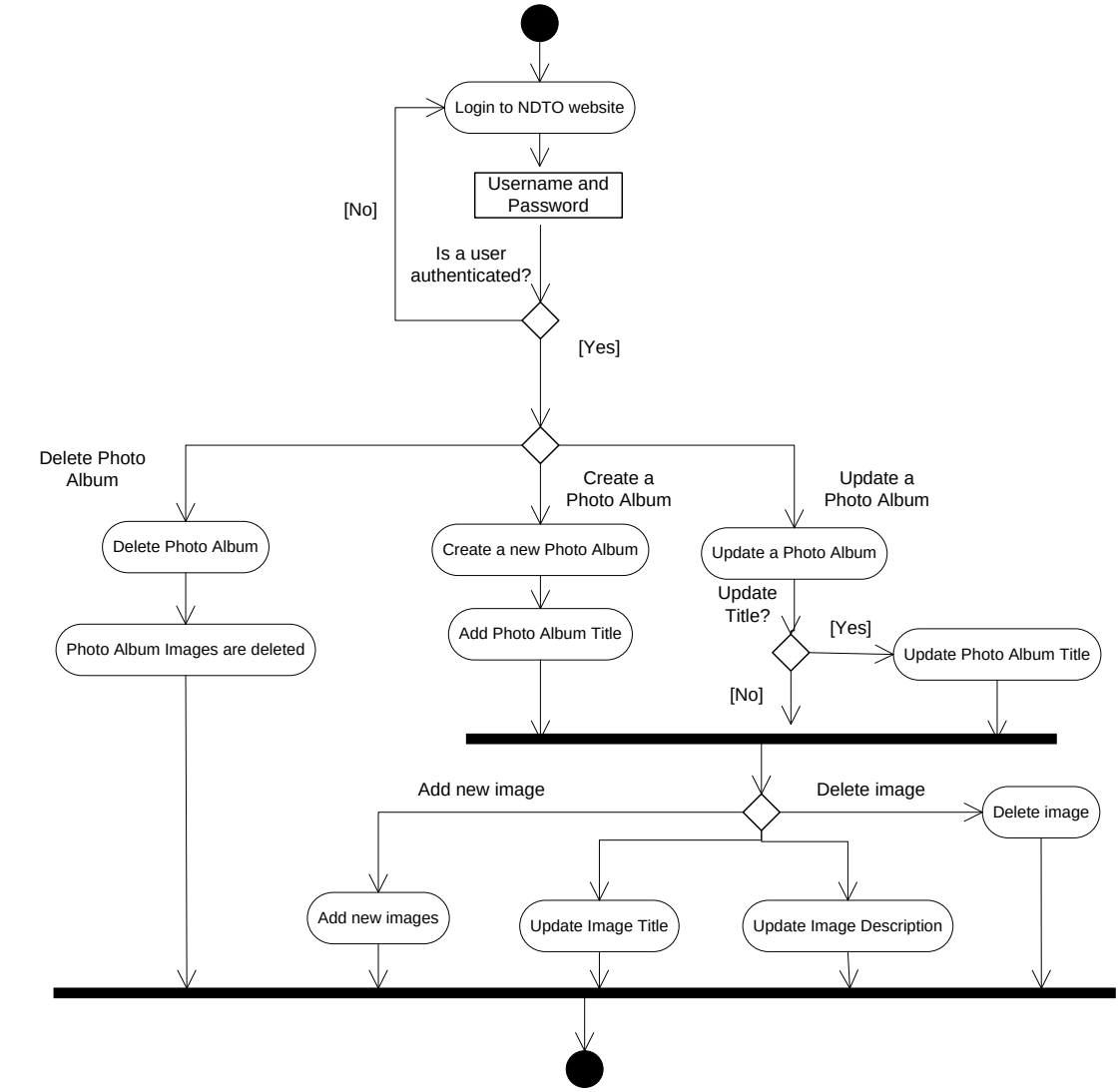
- The class “Admingallery.aspx.cs” processes requests from Graphical User Interface on administration side. The class receives data from input fields and processes the requests according to events triggered on the Graphical User Interface (web form), if the button “browse”, “submit”, “delete” or “update” were clicked. The front-end class “Admingallery.aspx.cs” displays the list of galleries (photo albums) on the administration webpage so that authenticated user could always select, update or delete any photo album. All photo albums are pulled from the List class created by the back-end “Gallery” class. If a new photo album is created then the front-end class “Admingallery.aspx.cs” assigns unique ID number and Title to the new album. The front-end class creates a folder on a web server with unique album ID number. All information about new album is assigned to the back-end class “Gallery” for further processing it in the database. The front-end class “Admingallery.aspx.cs” also populates values “Add New”, “Show All” and “Update” to the drop down list on the Graphical User Interface when the webpage is loaded. The same class “Admingallery.aspx.cs” can also manage images. By means of the class “Admingallery.aspx.cs” authenticated users can add, updated and delete images in the Photo

Gallery. When new image is uploaded, the class "Admingallery.aspx.cs" assigns unique ID number to the image. The image is saved to the appropriate folder that corresponds to photo album ID number on a web server.

- The classes "Photogallery.aspx.cs" and "Picture.aspx.cs" have ability to display images on the public side of NDTO website. The classes "Photogallery.aspx.cs" and "Picture.aspx.cs" pull images from a web server based on their unique IDs and display them according to predefined categories and resolutions (images with small resolutions are displayed as thumbnails and images with higher resolutions are displayed in the zoomed mode). All information about images is pulled from the list of objects created by back-end classes "Gallery" and "Picture"

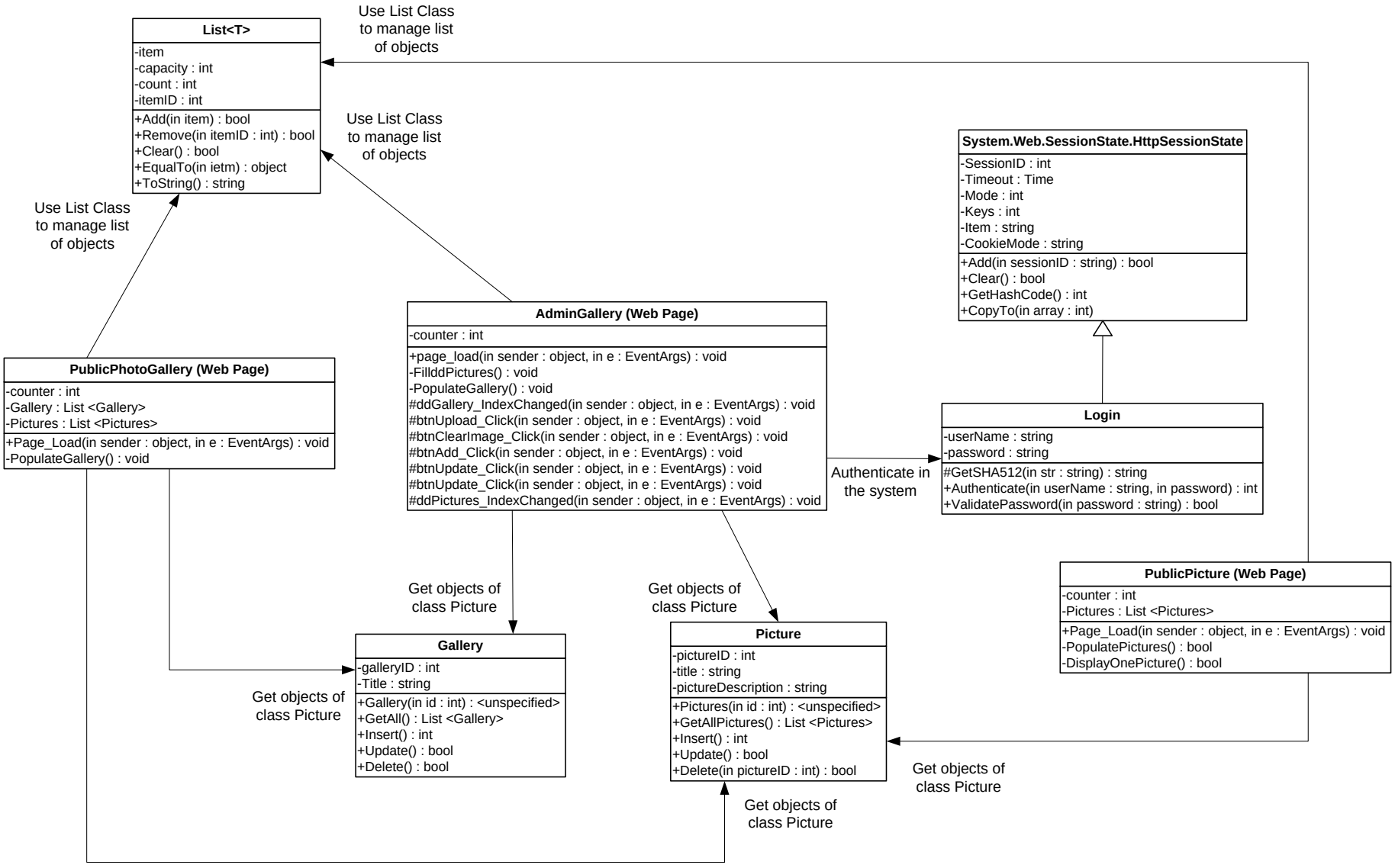
5.0 ACTIVITY DIAGRAM

Dynamic Phot Gallery – Administration Side (can be accessed by authenticated users only)

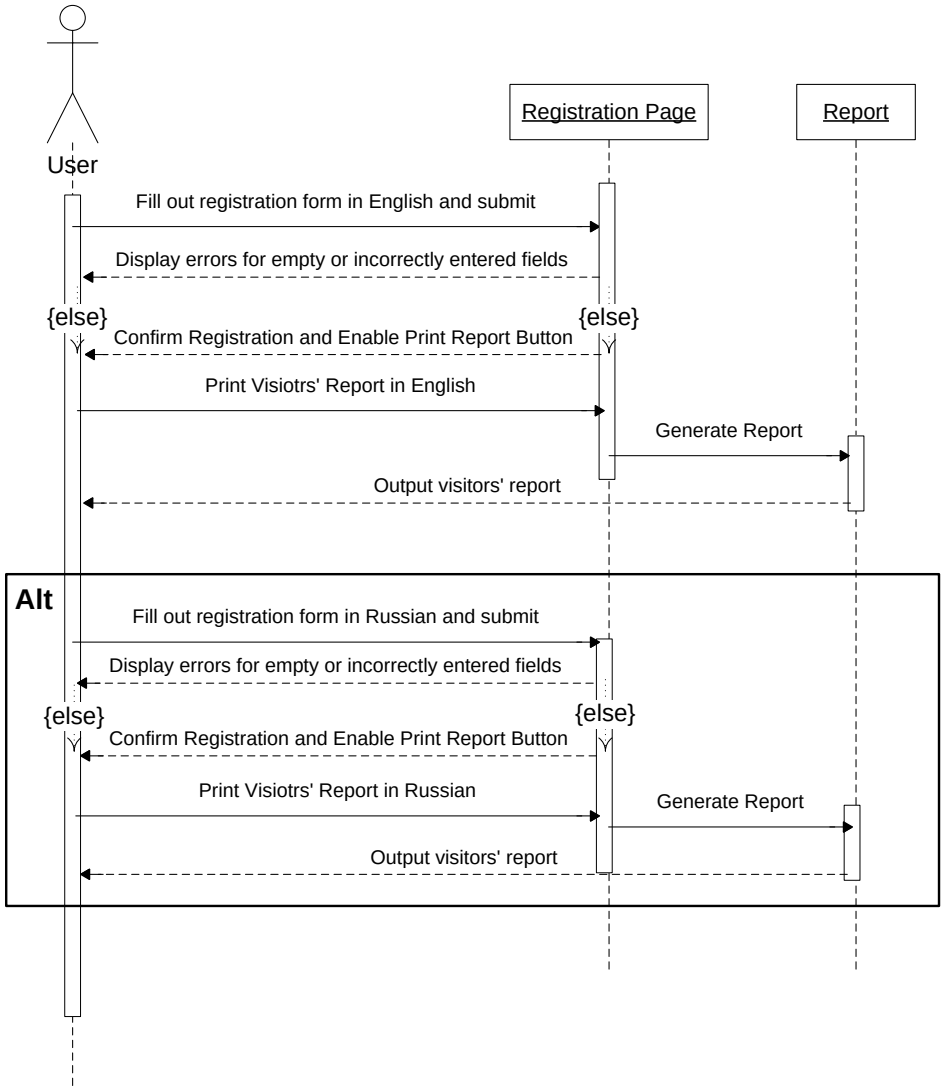


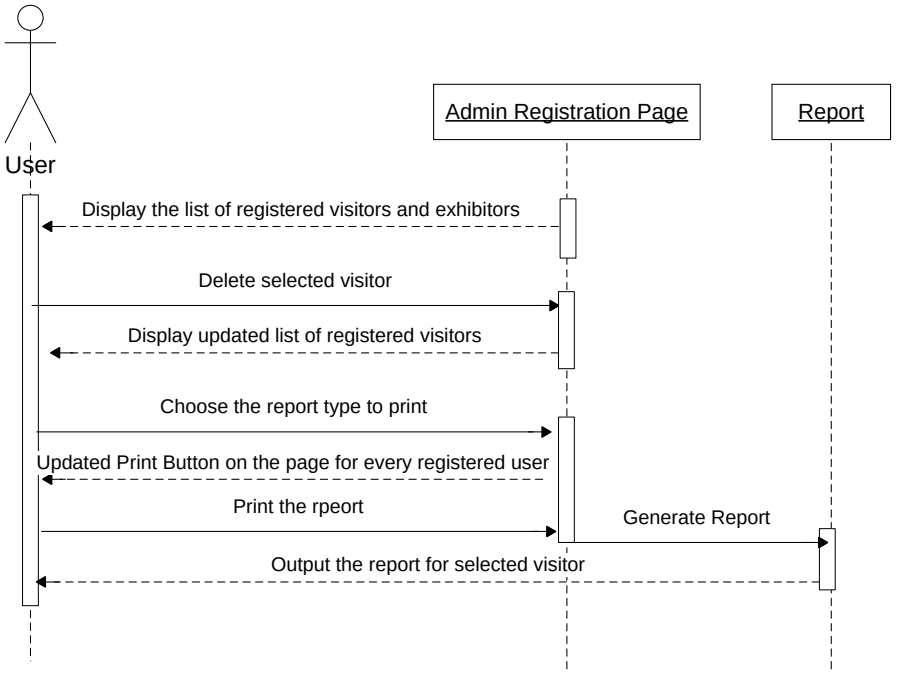
Dynamic Phot Gallery – Public Side (can be accessed by any website visitors)

6.0 CLASS DIAGRAM



7.0 SEQUENCE DIAGRAM

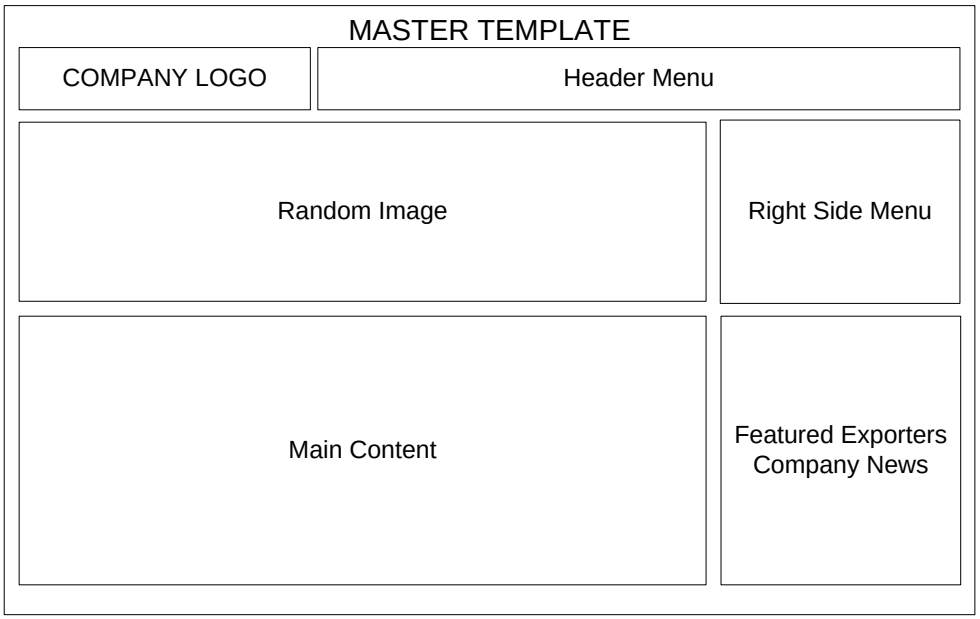




8.0 COMPONENT DEPENDENCY DIAGRAM

NDTO website is implemented through ASP.NET Master Templates.

The structure of NDTO master template is provide in the diagram below:



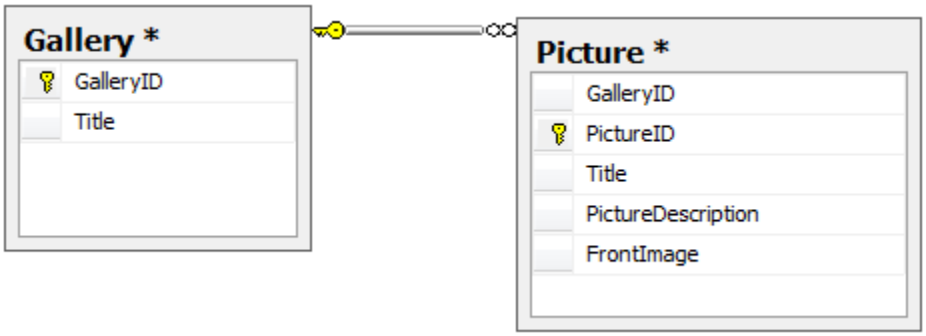
The Master Template consists of placeholders responsible for different functionality on the website. Every placeholder renders appropriate webpage. The master Template consists of the following placeholders:

Placeholder	Placeholder Description
Master Template	ASP.NET master template allows developers to create a consistent layout for all webpages without repeating the same code and interface multiple times. When new page is created it consists of the same structure and placeholders.
Header Menu	The Header Menu Placeholder renders the main menu options of NDTO website such as Home, Membership, Services Offered, Job Seekers, News, Staff Login.
Right Side Menu	The right side menu of NDTO website displays the menu options according to the selections in the Header Menu. In other words, the right side menu is the submenu of the Header Menu. For example, if we select “Services Offered” option in the Header Menu the right side menu displays appropriate options that correspond to the selection in the header menu: “Market Research”, “Export”, “Trips Abroad”, “Brand Promotion” etc.
Random Image	This placeholder displays images randomly and demonstrates what services NDTO offers to their customers. Website visitors can always take a look at visual representation of company business through Random Image Placeholder.
Main Content	The Main Content Placeholder renders the main functionality of the website. Big Iron Registration system and Dynamic Photo Gallery are displayed in the Main Content Placeholder

Featured Exporters and Company News	The Place Holder "Featured Exporters and Company News" displays company news and North Dakota companies that had the biggest achievements in exporting of their products or services

By means of such design the development process gets easier and automated. Every time when developers create a new webpage they don't have to repeat the same code and web design multiple times. ASP.NET Master Template copies the structure of NDTO website automatically so that developers can always focus on the implementation of the functionality they need in predefined area of the website. The design implemented based on Master Template and Place Holders provides separation of functionality, code localization, low coupling and high cohesion.

9.0 DATABASE DESIGN



10.0 DESIGN CONSIDERATIONS

Consideration of Image Resize Algorithm

Dynamic Photo Gallery contains the algorithms that allow the system to resize images of any size to predefined resolution without losing quality and proportions when they are uploaded to a web server. The algorithm of image resize consists of several steps:

1) On the first step the algorithms predefines image sizes of photo album thumbnails, image thumbnails and main images. The resolution of photo album thumbnail (gallery thumbnail) is predefined as 130 x 130; the resolution of image thumbnail is 100 x 100 and the resolution of the main image is 500 x 500.

2) The second step is the most important one when algorithm identifies initial image size (width, height), resize the image to predefined resolutions and then upload them to the web server. By means of the class "System.Drawing.Image" from .Net Framework Class Library the algorithm determines image current width and height.

If the height of the image is greater than width than then the width of uploaded image is determined based on the following formulas:

FRONTTHUMB_IMAGE_WIDTH =((FRONTTHUMB_IMAGE_HEIGHT * Width) / Height);

BACKTHUMB_IMAGE_WIDTH = ((BACKTHUMB_IMAGE_HEIGHT * Width) / Height);

MAIN_IMAGE_WIDTH = ((MAIN_IMAGE_HEIGHT * Width) / Height);

The predefined heights 100, 130 and 500 are multiplied by the width of the actual picture, that is being uploaded, and divided by height of this picture. The height of uploaded pictures is equal to the predefined height of 100, 130 or 500.

For example, if we upload image with resolution 800 by 600 pixels then the algorithm resizes the image to the following sizes:

The Width of Front Thumbnail Image (photo album thumbnail image) = 130 * 600 / 800 = 97.5 pixels and the height of this image is equal to 130 pixels. So the size of the front thumbnail image is equal to 97.5 by 130 pixels

The Width of Back Thumbnail Image (image thumbnail) = 100 * 600 / 800 = 75 pixels and the height of this image is equal to 100 pixels. So the size of the back thumbnail image is equal to 75 by 100 pixels

The Width of Main Image (main image) = 500 * 600/800 = 375 pixels and the height of this image is equal to 500 pixels. So the size of the main image is equal to 375 by 500 pixels

If the height of the image is lower than width or equal to width then the following formula is applied:

FRONTTHUMB_IMAGE_HEIGHT = ((FRONTTHUMB_IMAGE_ HEIGHT * Height) / Width);

BACKTHUMB_IMAGE_HEIGHT = ((BACKTHUMB_IMAGE_MAX_ HEIGHT * Height) / Width);

MAIN_IMAGE_HEIGHT = ((MAIN_IMAGE_ HEIGHT * Height) / Width);

The predefined heights of the image (which are 130, 100 and 500) are multiplied by the height of the uploaded picture and divided by the width of uploaded picture. For example, if we upload image with resolution 700 by 900 pixels then the algorithm resizes the image to the following sizes:

The Height of Front Thumb Image (photo album thumbnail image) = 130 * 700/900 = 101 pixels and the width is equal to 130 pixels. The final resolution of uploaded picture is equal to 130 by 101 pixels

The Height of Back Thumb Image (image thumbnail) = 100 * 700/900 = 77.8 pixels and the width is equal to 100 pixels. The final resolution of uploaded picture is equal to 100 by 77.8 pixels

The Height of Main Image (main image) = 500 * 700/900 = 388.9 pixels and the width is equal to 500 pixels. The final resolution of uploaded picture is equal to 500 by 388.9 pixels

3) On the third step the algorithm creates three images with resolutions calculated based on the formals provided above. By means of the class Bitmap from .Net Framework Class Library the images are saved to the web server in the folder created based on photo album unique ID.

11.0 EXPLANATION OF THE FUNCTIONALITY.

11.1 DYNAMIC PHOTO GALLERY - ADMINISTRATION SIDE

"Admingallery.aspx" is the name of the administration webpage of the dynamic photo gallery
After a user is successfully authenticated on NDTO website the user gets access to administration webpage "Admingallery.aspx". On this webpage the user can create a new gallery, select existing and manage pictures within selected gallery.

11.1.1 CREATE A NEW GALLERY

The user select the option "-- Add New --" in the Gallery Drop Down List and enters Title of the gallery. After that the user clicks the button "Add" as it show in the Figure 1.

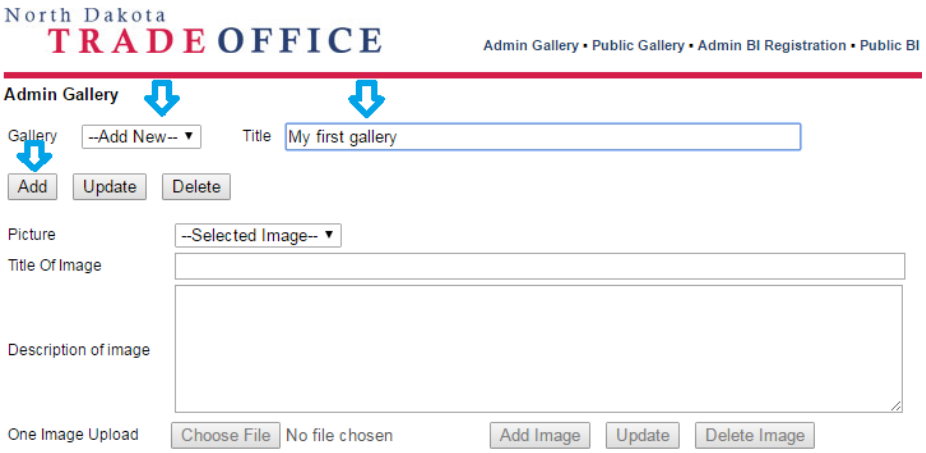


Figure 1. Add a new gallery

11.1.2 UPDATE GALLERY

Select any existing gallery from the gallery drop down list => change the title of the gallery and click the button "update"

11.1.3 DELETE GALLERY

Select any existing gallery from the gallery drop down list and click the button "delete" as it is show in the Figure 2.

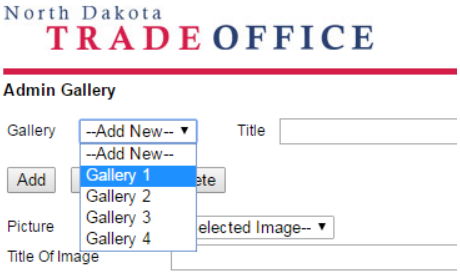


Figure 2. Selection of the existing gallery from the drop down list.

11.1.4 ADD A NEW IMAGE

Select an existing gallery or create a new one => click the button "Choose image" => select an image from your local computer in popped up file dialog => after selecting the image, the image name will show up on the admin webpage => provide an image title and description (title and description are optional and are not required) => click the button "Add image". The image will show up in the administration gallery webpage as it is show in the Figure 3.

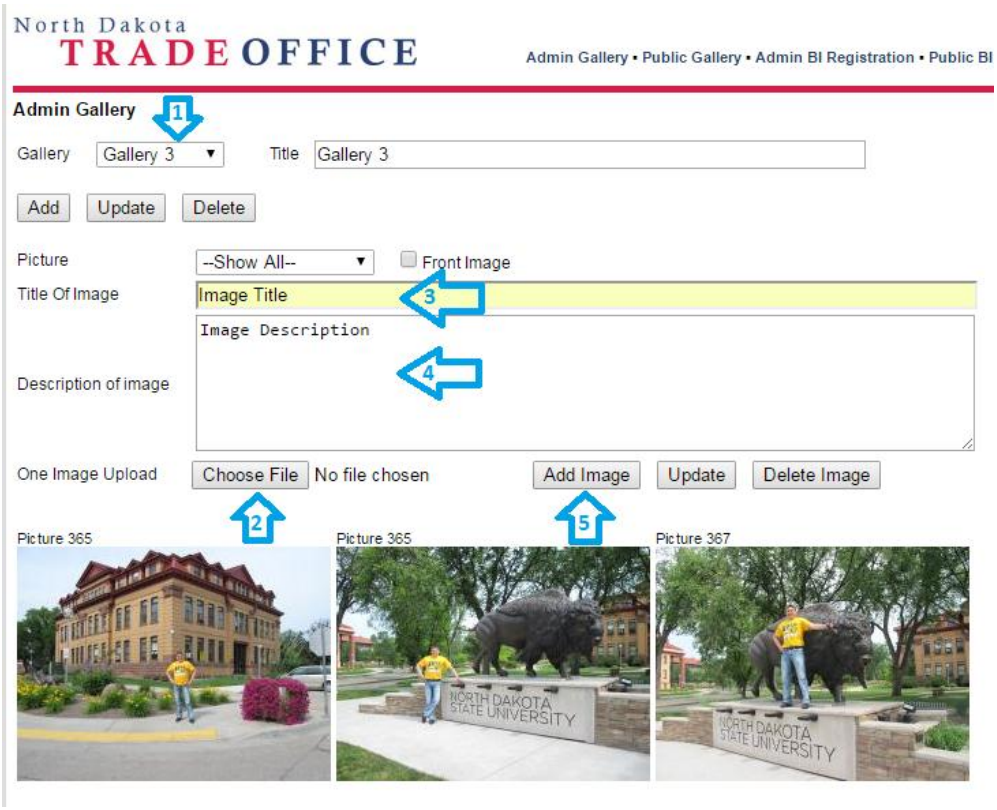


Figure 3. Add a new image

11.1.5 UPDATE AN EXISTING IMAGE

Select a gallery => click on thumbnail view of an image which needs to be updated => the image is displayed in the zoom mode => make necessary changes in the image title and description and click the button update, as it is sown in the Figure 4

11.1.6 DELETE AN EXISTING IMAGE

Select a gallery => click on thumbnail view of an image which needs to be deleted => the image is displayed in the zoom mode => click delete button, as it is show in the Figure 4

11.1.7 VIEW IMAGES IN THE ZOOM MODE

Select gallery => click on thumbnail view of any image in order to view images in the zoom mode => the image is displayed in the zoom mode => click buttons backward or forward located on the sides of the image to scroll through the images backward of forward in the zoom mode, as it is show in the Figure 4

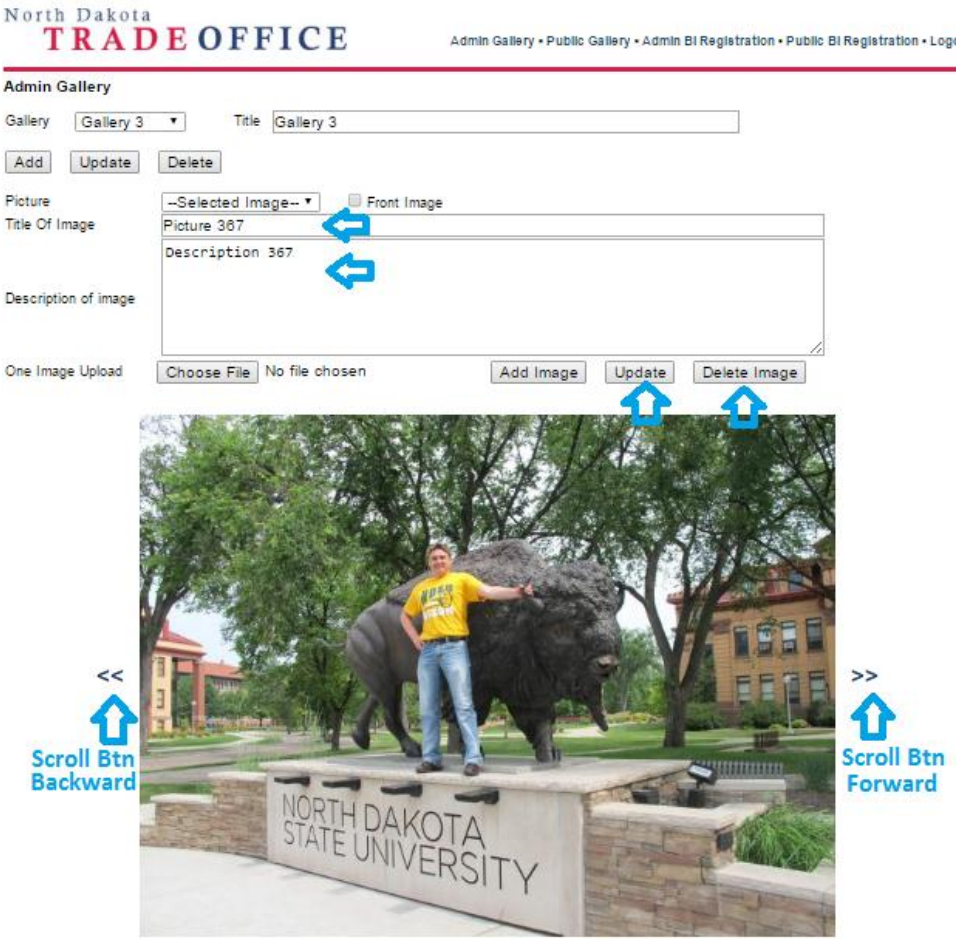


Figure 4. Update, delete or scroll images

11.1.8 ENABLE COVER IMAGE FOR GALLERY

Select gallery => select thumbnail view of an image => the image is displayed in the zoom mode => click the check mark "Front Image" as it is show in the Figure 5 => click button update

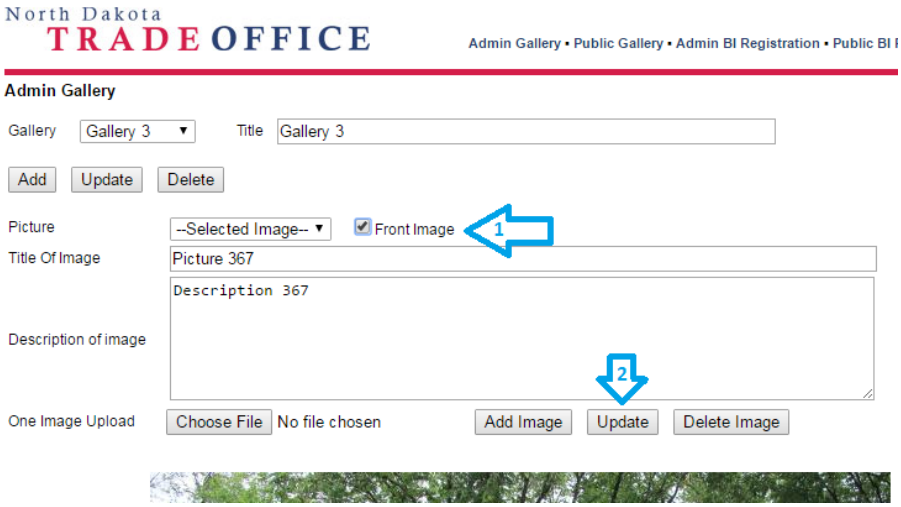


Figure 5. Enable cover picture for gallery

11.2 DYNAMIC PHOTO GALLERY - PUBLIC SIDE

"Photgallery.aspx" is the name of the public webpage of the dynamic photo gallery
The public side of the dynamic photo gallery is available for any website visitors. The users will just need to select interesting for them gallery from the right side menu and select the gallery they want to view as it is show in the Figure 6

Figure 6. Public gallery