CS 496 Assignment 2: Dynamic Pages

Kelvin Watson ONID: watsokel Student ID: 932540242

# **Dynamic Pages Documentation**

URL to live web application: <a href="http://malenah-portal.appspot.com/">http://malenah-portal.appspot.com/</a>

# Description of the web application/site

The web application, called the M.A.L.E.N.A.H. Portal, is constructed on the Google App Engine cloud service/platform in Python.

MALENAH stands for Mobile Ally for LGBT people, Enhancing, through a Network, Access to Healthcare. LGBT people face barriers to healthcare access and have a host of unique health-related needs. As such, the web application/site http://malenah-portal.appspot.com serves as an administrator portal, storing information about caring and culturally competent healthcare providers who are equipped to care for LGBT people in the hopes of closing the LGBT health disparities gap.

The MALENAH portal stores information about healthcare providers. Healthcare providers (class Provider) are stored as NDB models (entities) in the NDB datastore, including physicians, dentists, pharmacists, nurses, counsellors, and others. Providers have the following properties:

Attribute of the Provider class (NDB Model)	NDB Property type [1]	Description	Form input
first_name	ndb.StringProperty()	Healthcare provider's first name	<input type="text"/>
last_name	ndb.StringProperty()	Healthcare provider's last name	<input type="text"/>
phone	ndb.StringProperty()	Healthcare provider's phone number	<input type="tel"/>
email	ndb.StringProperty()	Healthcare provider's email address	<input type="email"/>
website	ndb.StringProperty()	Healthcare provider's website url	<input type="url"/>
best_time	ndb.TimeProperty()	Best time to contact the healthcare provider	<input type="time"/>
designation	ndb.StringProperty()	The healthcare provider's designation/degree (e.g. MD, RN, Pharm.D)	<input type="radio"/>
service(s)	ndb.KeyProperty (repeated=True)	Service(s) offered by the healthcare provider	<input type="checkbox"&gt;</input 
accept_new_patients	ndb.BooleanProperty()	Whether or not the healthcare provider is accepting new patients	<input type="radio"/>

The datastore also stores two additional NDB models as entities: healthcare services and healthcare
professional designations, both of which have a name as a StringProperty() and are associated with
healthcare providers.

Attribute of the Designation class (NDB Model)	NDB Property type [1]	Description	Form input
name	ndb.StringProperty()	Name of the designation associated with a healthcare provider	<input type="text"/>

Attribute of the Service class (NDB Model)	NDB Property type [1]	Description	Form input
name	ndb.StringProperty()	Name of the service provided a healthcare provider	<input type="text"/>

 $\frac{\textbf{Test Plan}}{\textbf{To ensure that the web application is working properly, I used this test plan, containing 31 manual tests.}$ 

#	Type		Input	Expected Outcome	Observed Outcome	
1	Blank	Empty database. Attempt to submit the "Add Provider" form with empty fields in Google Chrome, Firefox.	Click on the submit button in the "Add Healthcare Provider" form.	HTML5 form should prompt the user to complete the required fields before form can be submitted.	allow submission without required fields completed.  First Name  Last Name	
2	Edge case	Empty database. Attempt to submit the "Add Provider" form with empty fields in Safari,	Click on the submit button in the "Add Healthcare Provider" form.	HTML5 form should prompt the user to complete the required fields before form can be submitted.	Last Name Please fill out this field. The following error messages appear, as expected:  Form Submission is Unsuccessful for the following reason(s):	
		where support for the "required" tag is only partial [1].			You did not enter a first name. You did not enter a last name. You did not enter a last name. You did not enter an email. You did not enter an email. You did not enter a website. You did not enter a contact time. You did not enter whether or not new patients are being accepted,	
3	Blank	Submit empty		HTML5 form should prompt user to	In the Google Chrome browser, the designation form	Formatted: Font: 7.5 pt, Italic
		designation	the "Add a Designation" form.	complete required field before submitting.	does not allow submission due to the required attribute on the input tag. This is the correct outcome. In the Safari browser, as expected, the form submits but the following error message is displayed to the user: Unable to add record for the following reason(s): You did not enter a designation to add. This is also	Formatted: Font: 7.5 pt
4	Blank	Submit empty service	Click on the submit button in	HTML5 form should prompt user to	In the Google Chrome browser, the designation form	Formatted: Font: 7.5 pt, Font color: Auto
			the "Add a Service" form	complete required field before submitting.	does not allow submission due to the required attribute on the input tag. This is the correct outcome.	Formatted: Font: 7.5 pt
					In the Safari browser, as expected, the form submits but the following error message is displayed to the user: Unable to add record for the following reason(s):  You did not enter a service to add. This is also the	
5	Edge	Empty database, create	Enter "Counselling" into the	Counselling service added	correct outcome for this browser.  Service is recorded as expected	Formatted: Font: 7.5 pt, Font color: Auto, Not
	J	first (non-empty) service		successfully (as shown in the /view page) and appears as a radio button	Record added	Formatted: Font: 7.5 pt
				choice in the "Add Provider" form on form submission.	You added the following record (Service):   Service: Lab Services	Formatted: Font: 7.5 pt
				No records in the Provider or Designation tables	Back to Home Service now appears in the provider form	Formatted: Font: 7.5 pt
					Designation—  RN	Formatted: Font: 7.5 pt
					Services (check Lab Services Currently accep	
6	Edge		Enter "Pharm.D" into the	Pharm.D designation service added		Formatted: Font: 7.5 pt
		first designation	"Add a Designation" form	successfully (as indicated in the /view page) and appears as a checkbox in the "Add Provider"	You added the following record (Designation):  Designation: RN	Formatted: Font: 7.5 pt
				form. No records in the Provider or	Back to Home Designation appears in the provider form as	Formatted: Font: 7.5 pt
				Designation tables	expected. Best time of day to col	Formatted: Font: 7.5 pt
					Designation	Formatted: Font: 7.5 pt
					Services (check all	Formatted: Font: 7.5 pt
7	Edge	Empty database, create	first name: Kelvin	Provider successfully added as	Record successfully added as expected.	Field Code Changed
	Blank	first provider without first creating a service or a	last name: Watson phone: 9716786247	evidenced by the /view page Provider appears in Provider table	Record added	Formatted: Font: 7.5 pt
		designation	email: abc@abc.com website: http://abc.com	on form submission, with empty cells under the Designation and	You added the following-record (Healthcare Pr	Formatted: Font: 7.5 pt
			best time to contact: 11:59pm	Services columns.	First Name:   Kelvin	Formatted: Font: 7.5 pt
			designation: services:		Email:   kelvincswetson@gmail.com   http://labc.com   http://labc	Formatted: Font: 7.5 pt
			accepting patients: No.		Designation:  Services:  Services:  No	Formatted: Font: 7.5 pt
					Back to Home	Formatted: Font: 7.5 pt

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3	Edge	Empty database, create	first name: Kelvin	Provider successfully added as	Provider is successfully added and does not show
	Blank	first provider without first	last name: Watson	evidenced by the /view page	any associated designations, as expected.
		creating a service but	phone: 9716786247	, , ,	Record added
	i	having created a	email: abc@abc.com		Record added
	i				
	i	designation	website: http://abc.com		You added the following record (Healt
	i		best time to contact:		
	i		11:59pm		First Name: Kelvin
	i		designation:		Last Name: Watson
	i				Phone: 9716786247
	i		services: Counselling		Email: abc@abc.com
	i		accepting patients: Yes		
	i				Website: http://abc.com
	i				Best Time to Contact You: 23:59
	i				Designation:
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					Services: • Counselling
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	i				Accepting Patients: Yes
					Back to Home
	i				Dack to Home
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	Edge	Empty database, create	first name: Kelvin	Provider successfully added as	Record is added as expected.
	Blank	first provider without first	last name: Watson	evidenced by the /view page	Record added
	Dianic				Record added
	i	creating a designation	phone: 9716786247	Provider appears in Provider table	
	i	but having created a	email: abc@abc.com	on form submission, with empty cell	You added the following record (Healthcare P
	i	service	website: http://abc.com	under the Services columns, but the	Terror Maria
	i	33.1.30			First-Name: Kelvin
	1	1	best time to contact:	"B.Sc" designation under the	Last Name: Watson
	i	1	10:59AM	Designation column.	Phone: 1234567890
	i	1	designation: B.Sc.	B.Sc should also be in the	Email: kelvincswatson@gmail.com
	1	1			Website: http://abc.com
	i	1	services:	Designations table beneath the	Best Time to Contact You: 10:59
	1	1	accepting patients: No.	Provider table in the view and admin	Designation: B.Sc
	1	1		pages.	Services:
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					Designations
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					B.Sc
)	Edge	Delete all services, even	Delete all services using the	"All Records Currently in Database"	Under "All Records Currently in Database,"
		though they have been	Datastore Admin and refresh	provider table should still render the	Designation table is empty, but provider tables st
	i				
	i	associated with	the /admin page	previously added services	contain designations. This is the desired outcome
		providers			Ac Ac
		[*			n Services P
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٦	Edgo	Navigate to the high	malenah-	Pedirects to /admin	Pedirects to /admin as expected
	Edge	Navigate to the /view	malenah-	Redirects to /admin	Redirects to /admin as expected.
	i	page directly.	portal.appspot.com/view	1	
•	Edge	Navigate to the /edit	malenah-	Redirects to /admin	Redirects to /admin as expected.
+				. todii ooto to/damiii	real oco to radifili do expedied.
		page directly	portal.appspot.com/edit	1	
3	Edge	Navigate to an invalid	malenah-	Redirects to /admin page	Redirects to /admin as expected.
٦		url e.g. malenah-	portal.appspot.com/a!	1.3.4	
	i		portanappopot.com/a:		
		portal.appspot.com/al			
ļ	Edge	Navigate to the /admin	malenah-	Correctly renders administration	Correctly renders administration page with forms
		page directly.	portal.appspot.com/admin	page with forms	4
ì	<u>Basic</u>	Duplicate designation	Add designation "MD" twice	Reject the addition of designations	Unable to add record for the following reason(s):
- ]	_	1		with the same name as a	
	i	1		designation entity already in the	The designation you are trying to add already exi
	i	1			
		1		database.	the database.
Ĺ	Basic	Duplicate service	Add service "Counseling"	Reject the addition of services with	Unable to add record for the following reason(s):
-			twice	the same name as a service entity	The service you are trying to add already exists in
	1	1			
		1		already in the database.	database
	Basic	Enter invalid URL for	Enter "abc.abc" in the	Should reject invalid URLs, such as	The website field expects either http:// or https://
	i	website	website field of the provider	those with incorrect or missing	field and invalid inputs such as "abc.abc" are corr
		1	form,	protocols and/or top-level domains	rejected.
		1			abc.abc
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					09:15 AM Please enter a Uf However, as long as the protocol is provided, an invalid URL is still accepted. This is not a desired
7.4					However, as long as the protocol is provided, an invalid URL is still accepted. This is not a desired outcome.
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					However, as long as the protocol is provided, an invalid URL is still accepted. This is not a desired outcome.  Website: http://abc
	Basic	Enter invalid phone	'abc-def-ghij'	Application should reject invalid	However, as long as the protocol is provided, an invalid URL is still accepted. This is not a desired outcome.
	Basic		'abc-def-ghij'		However, as long as the protocol is provided, an invalid URL is still accepted. This is not a desired outcome.  Website: http://abc  The application accepted an invalid phone numb.
	Basic	Enter invalid phone number	'abc-def-ghij'	Application should reject invalid phone numbers	However, as long as the protocol is provided, an invalid URL is still accepted. This is not a desired outcome.  Website: http://abc

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				Last Name: Vanderbill	/	
				Phone: abcdefghij	/	
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				Email: L@Vanderbill.org	/	
				Website: http://LiamVanderbill.org	/	
				Best Time to Contact You: 11:00		
				Designation: MD	/	
				Services: • Weight Management	/	
				Accepting Patients: Yes		
Blank	Enter invalid email	"helena@bolton"	Application should reject invalid	The application accepted an invalid email address		
Basic	Zinoi iiivana oman	TOO	emails	missing a top-level domain. This is not the desired		Formatted: Font: 7
				Record added		Formatted: Font: 7
				You added the following record (Healthcare		Formatted: Font: 7
				First Name: Helena		
				Last Name: Bolton		
				Phone: 1234567890		
				Email: helena@bolton		
				Best Time to Contact You: 07:00		
				Designation: MD		
				Services: • Diabetes Education		
				Accepting Patients: Yes Back to Home		
Q Blank	Submit "Add a Provider"	Empty form field	Application should either reject the	In the Google Chrome browser, the "required"		Formatted: Font: 7
	form with missing first name in Chrome and		form submission (Chrome) or	attribute in the input tag correctly disallows form submission without first entering input into the form		Formatted: Font: 7
	Safari. ("required"		display an error message (Safari)	field.		Formatted: Font: 7
	attribute is not supported in Safari).			First Name		
				Last Name Please fill out this field.		Formatted: Font: 7
				In the Safari browser, the correct error message is		Formatted: Font: 7
				displayed:		
				Unable to add record for the following reason(s):		
1 Blank	Submit "Add a Provider"	Empty form field	Application should either reject the	You did not enter a first name.  In the Chrome browser, form submission is rejected		Formatted: Font: 7
	form with missing last		form submission (Chrome) or	due to the "required" attribute for the input tag, as	1	Commetted Control
	name. ("required"		display an error message (Safari),	expected:		Formatted: Font: 7
	attribute is not supported in Safari).			Last Name		Formatted: Font: 7
				Phone		Formatted: Font: 7
				124545790 Please fill out this field.		Formatted: Font: 7
				In the Safari browser, the result is the following error		
				message, as expected: Unable to add record for the following reason(s):		Formatted: Font: 7
2 Blank	Submit "Add a Provider"	Empty form field.	Application should either reject the	You did not enter a first name.  In the Chrome browser, form submission is rejected		Formatted: Font: 7
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	supported in Safari			1234567890	///	
				Email   Please fill out this field.		Formatted: Font: 7
				In the Safari browser, the result is the following error	7	Formatted: Font: 7
				message, as expected:  Unable to add record for the following reason(s): You		Formatted: Font: 7
				did not enter a phone number.		Formatted: Font: 7
3 Blank	Submit "Add a Provider"	Empty form field	Application should either reject the	In the Chrome browser, form submission is rejected		Formatted: Font: 7
	form with missing email. ("required" attribute is		form submission (Chrome) or display an error message (Safari)	due to the "required" attribute for the input tag, as expected:		Formatted: Font: 7
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				http:// Please fill out this field.		Formatted: Font: 7
				Unable to add record for the following reason(s): You did not enter an email.		Formatted: Font: 7

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Stank   Submit *Add a Provider   Submit provider form with   Form should still be successfully   Services   Lab Services   Service						Last Name: V	Vong	
Blank   Submit 'Add a Provider'   Submit provider form with   Form should still be successfully   The form is submitted successfully   Services   Indian to hexe   Indian to h						Phone: 3	3427891237	
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Submit 'Add a Provider'   Submit provider form with   Form should still be successfully   Submitted successfully, as expected   Since service(s) is not a required form field:   Record added   Record						Best Time to Contact You: 1	12:59	
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Accord added   Free Name   Management   Free Name	25	<u>Blank</u>	Submit "Add a Provider"	Submit provider form with	Form should still be successfully			
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input fields.  forn-unbale to add record for the following reason(s): You did not enter a first name. You did not enter a phone number.  Form submission was allowed, but this is not the desired result. Notice the invalid characters in the small and website fields.  You added the following record (Health  First Name: Relvin Last Name: Relvin Last Name: Relvin Best Time to Contact You: 12:59  Designation: B.Sc  Services: Lab Services  Accepting Patients: No Back to Home  Click on "Edit" next to a provider with no associated services.  Click on "Edit" next to a provider with no associated services.  Edit form should show no checked services.  Edit form should show no che	20				Should not allow form submission.			iido
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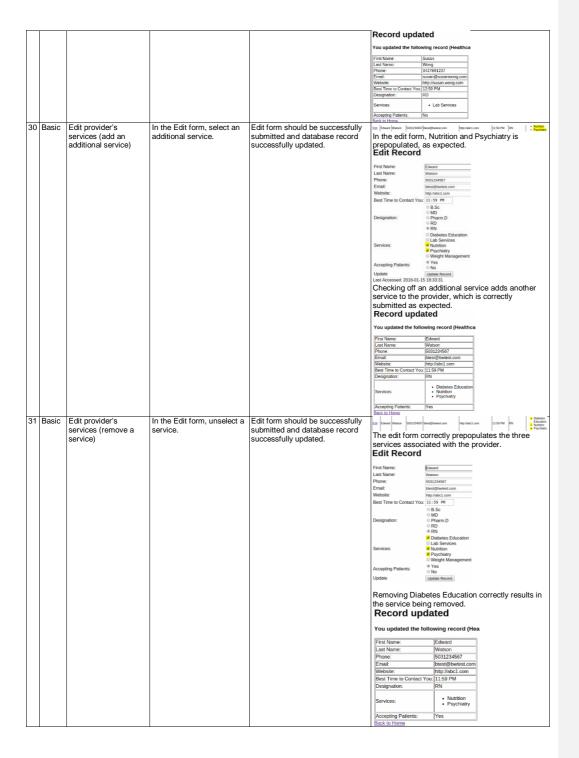
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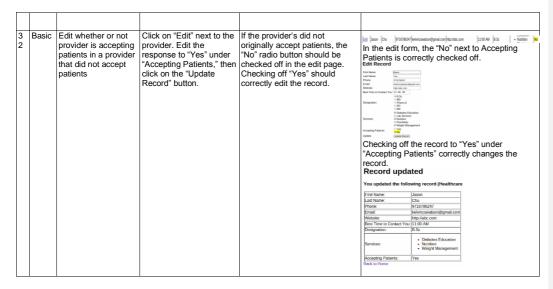
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# **Results of Executing Test Plan**

The process of documenting the test plan initially revealed a number of bugs, most of which have now been fixed. These bugs were mostly due to inadequate error checking, and including the following:

Bugs	Explanation of Fixes
Duplicate entries of designations and services did not get caught	FIXED On an attempt to insert a designation or service entity into the database, a check is performed by retrieving all designations or services and comparing the names of all queried entities with that of the user's input. If an entity is identified with the same name as the name entered on user input, the database insertion is rejected.
Routing bug - navigating directly to /view or /edit does not automatically redirect to the /admin page	FIXED By fixing the app.yaml routing url's and fixing the order of the handlers in main.py, direct navigation to /view, /edit, or /(any character(s)) will result in redirection to /admin so that the AdminHandler can render the admin page.
Routing bug – handlers placed in the wrong order resulting in the admin page always being rendered instead of the edit page.	FIXED The default route '.*' should be the listed last as the application tries to match the routes in order. [5]
Missing input validation for empty form input fields. Safari allows forms to be posted/submitted even when input fields containing the "required" attribute are left empty	FIXED If the Safari browser is used, empty form fields are now detected and a corresponding error message is displayed. In the Chrome browser, the "required" attribute of the input tags correctly detect empty form fields.
Missing return statement in post and get methods when form input invalid	FIXED Adding a return statement in the post and get methods when form input is invalid correctly prevents additional calls to get and post on error.

### **Explanation of Failures**

There are several outstanding bugs, which include the following:

- 1. The application currently does not parse URL's, and accepts invalid URL's with missing top-level domains and stores them in the database as strings.
  - In order to fix this bug, I could use regular expressions. An easier way would need to import a library such as the validator library, urlparse from urlparse, or the URLValidator from django.core.validators in Python to parse URL's. [6] [7]
- 2. The application currently does not parse phone numbers. Instead, it accepts invalid phone numbers and stores them in the database as strings..
  - In order to fix this bug, I would need to import a library such as phonenumbers 7.2.3 in Python to parse phone numbers. [8]
- 3. The application currently does not parse email addresses, and accepts invalid email addresses and stores them in the database as strings.
  - In order to fix this bug, I would need to import a library such as validate\_email 1.3 in Python to parse phone numbers. The Python validators library is also able to validate emails. [6] [9]

#### **Discussion of Templating to Display Data**

Specifically, using Jinja templating to implement logic, render variables, access properties. For logic, I used the following control structures: the *for* loop, the *if/elif/else* statements. I also used Jinja for comparison of strings for equality, for example, {% if s.name == t.name %} compares two strings.

By using the *extends* tag, I was able to extend an html template called index.html to all of my other page templates. For instance, in my admin.html template, I used the statement {% include index.html' %} to prevent the need to duplicate html tags and jinja expressions common among the pages, such as <html>, <head>, <title> <body> or {{title}}.

Using the *extends* tag also allowed me to override blocks within the index.html template as necessary. For instance, index.html contains a content *block* {% block content %} as well as an "all database data" block {% block all\_database\_data %}. Only the admin and view pages override the all\_database\_data block. All pages override the content block.

Finally, I used filters to pipe expressions into Jinja's built-in filters, including *length()* to get the number of items in a list, and *string()* to convert a string to Unicode.

## Reflection (Changes I would make if I had to do it over again)

I would design my application more thoroughly prior to coding to reduce the amount of code duplication. For instance, the get() and post() methods in the view.py ViewHandler contains many lines of code in common. This indicates that incorporating an appropriate object-oriented design pattern could have resulted in much cleaner code.

Some features that I missed were text validation, including stripping of leading and trailing white space. In addition, there should be stricter input validation of phone numbers <input type="tel"> and emails <input type="tel"> records as explained in the outstanding bugs in the application. Importing of additional libraries to valid emails, phone numbers and website URL's can sufficiently address these issues.

Thinking ahead to the mobile application portion of the course, if I had to do this assignment over again, I would have made the code more adaptable/flexible to creating a sort of backend API to respond to requests from a mobile application.

## <u>Sources</u>

- [1] https://cloud.google.com/appengine/docs/python/ndb/db\_to\_ndb
- [2] http://caniuse.com/#feat=form-validation
- [3] http://jinja.pocoo.org/docs/dev/
- [4] http://jinja.pocoo.org/docs/dev/templates/
- [5] https://webapp-improved.appspot.com/guide/routing.html

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  [9] https://pypi.python.org/pypi/validate\_email