CLICK CLINIC

SCHEDULING APPOINTMENTS AND COMMUNICATING WITH PATIENTS

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HIGH LEVEL VIEW – CLICK CLINIC

Automatic communication and appointment arrangement

Scheduling appointments and walk-in slots

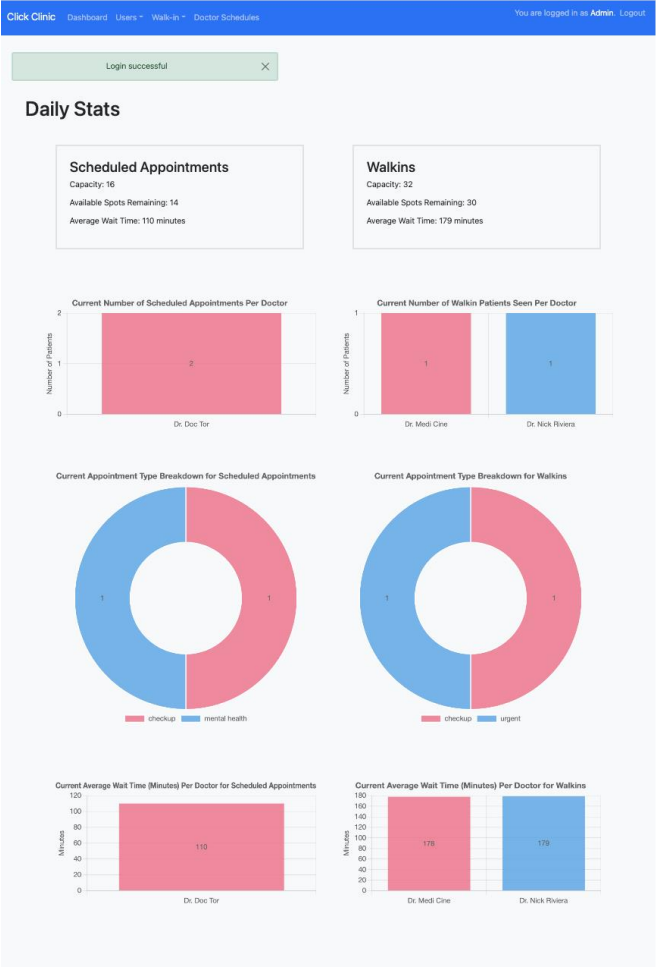Storage of medical information

Security

Relevant metrics and data visualization

Administrator

Doctor

Patient

Appointments
Walk-ins

Schedules

Click on a day to schedule doctors

November

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15 Tor, Doc **2** / Cine, M delete / Riviera, delete	16 Tor, Doc **4**	17 Tor, Doc delete	18 Tor, Doc **5**	19 Tor, Doc **2**	20
21	22 Tor, Doc	23 Tor, Doc	24 Tor, Doc delete	25 Tor, Doc **4**	26 Tor, Doc	27
28	29 Tor, Doc	30				

2021-11-18

Schedule a doctor

Select a doctor   Dr.Cine, N ▾

Schedule Type   Walk-in ▾

[Schedule]

Appointments List

Dr. Doc Tor

Cat, Karen - 10:30am - 11am	Delete
Cat, Karen - 9am - 9:30am	Delete
Cat, Karen - 11:30am - 12pm	Delete
Cat, Karen - 8am - 8:30am	Delete
Patient, Pat - 10am - 10:30am	Delete

Book an Appointment

2021-11-18

Doctor   [Choose a doctor ▾]

Patient   [▾]

Time Slot :   [choose a time slot ▾]

Appointment Type :   [checkup ▾]

Presence :   [face to face ▾]

*File Upload Optional. Only pdf, jpg, and png files under 3MBs accepted. Select a file :

[Choose File] No file chosen

Please provide a brief description of the uploaded file :

Reason :

[Book Appointment]

User 1 Profile

Role:	admin	
First Name:	Admin	Edit
Last Name:	[TheBoss]	Submit
Email:	admin@boss.ca	Edit
Password:	*****	Edit
Address:	4 somewhere blvd	Edit
Phone number:	156-324-5789	Edit
Date of Birth:	2021-09-25	Edit

Set new photo   [Choose File] No file chosen   [Upload]

[Delete User]

Search through your patients by name

k				Search

Last Name	First Name	DOB	Family Doctor	Patient File
Patient	Patrick	2021-10-20	Tor	Patient File
Cat	Karen	1959-05-04	Tor	Patient File

Add a referral to this patient's file

Upcoming Appointments

Appointment today at 8:30am - 9am

Appointment with Cat, Karen
face to face

I scraped my knee falling off my bike

Resume Appointment   View Patient File

Appointment today at 11am - 11:30am

Appointment with Patient, Pat
virtual

I'm too sad

Begin Appointment   View Patient File
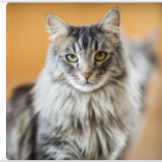
Appointment 2021-Nov-16 at 8:30am - 9am

Appointment with Cat, Karen
face to face

I'm sad!

Patient File for : Cat, Karen

Patient Information

Date of Birth: 1959-05-04

Medication History   Upload a file to this patient's file

Referral History   Add a referral to this patient's file

                          Add a medication to this patient's file

Appointment Records

Appointment Date:	Appointment Type:	Patient issue:	Appointment Status:	Doctor's Notes:
2021-Nov-25 8am - 8:30am	checkup	feeling better	upcoming	
2021-Nov-25 9:30am - 10am	checkup	My leg hurts	upcoming	
2021-Nov-25 11am - 11:30am	checkup	feeling weird	upcoming	
2021-Nov-25 11:30am - 12pm	checkup	My arm hearts	upcoming	

1 2 3 4 Next

Files uploaded to the patient

Upload Date	File description	File	Doctor's Notes About File
2021-11-14	a cat pic	Download	A cat pic
2021-11-15	test	Download	

Files uploaded by the patient

Upload Date	File description	File
2021-11-14	A cat	Download
2021-11-14	pdf file1	Download
2021-11-14	sdfkjsdfjlksdf	Download

Book an Appointment

November						
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16 **12** Appointments Available!	17	18 **11** Appointments Available!	19 **14** Appointments Available!	20
21	22 **16** Appointments Available!	23 App A	24	25 **12** Appointments Available!	26 **16** Appointments Available!	27
28	29 **16** Appointments Available!	30				

choose a time slot
8am – 8:30am
9am – 9:30am
9:30am – 10am
11am – 11:30am
1pm – 1:30pm
1:30pm – 2pm
2pm – 2:30pm
2:30pm – 3pm
3pm – 3:30pm
3:30pm – 4pm
4pm – 4:30pm
4:30pm – 5pm

Time Slot :
2021-11-16 at 9am - 9:30am
Appointment Type :

checkup ▾

Reason :

Type :

face to face ▾

*File Upload Optional. Only pdf, jpg, and png files under 3MBs accepted.
Select a file :

Choose File   No file chosen

Please provide a brief description of the uploaded file :

Book Appointment

My Prescriptions

Search by Medication Name:

Prescribed By	Medication Name	Number of Refills	Prescribed On	Instructions
Dr. Doc Tor	Rash cream	0	2021-11-14	Apply liberally on the affected area
Dr. Doc Tor	Advil	2	2021-11-12	Take for headaches

1

My Upcoming Appointments

Date	Time	Doctor	Appointment Type	Description	Type	Status	File Description	File Name	File	
2021-11-18	10am - 10:30am	Dr.Doc Tor	mental health	I feel very anxious about the presentation!	virtual	upcoming	A cat	cat2.jpg		Delete File
2021-11-16	10am - 10:30am	Dr.Doc Tor	urgent	I feel really sick!	virtual	upcoming	A cat	02-cat-training-NationalGeographic_1484324.jpg		Delete File
2021-11-15	11am - 11:30am	Dr.Doc Tor	mental health	I'm too sad	virtual	upcoming	NA	NA	NA	Upload File
2021-11-15	11am - 11:30am	Dr.Doc Tor	mental health	I'm too sad	virtual	upcoming	kitty	kitty2.jpg		Delete File
2021-11-16	11:30am - 12pm	Dr.Doc Tor	follow up	migrains	face to face	upcoming	NA	NA	NA	Upload File

Update/Cancel Upcoming Appointment ▾

CHALLENGES AND SOLUTIONS – CLICK CLINIC
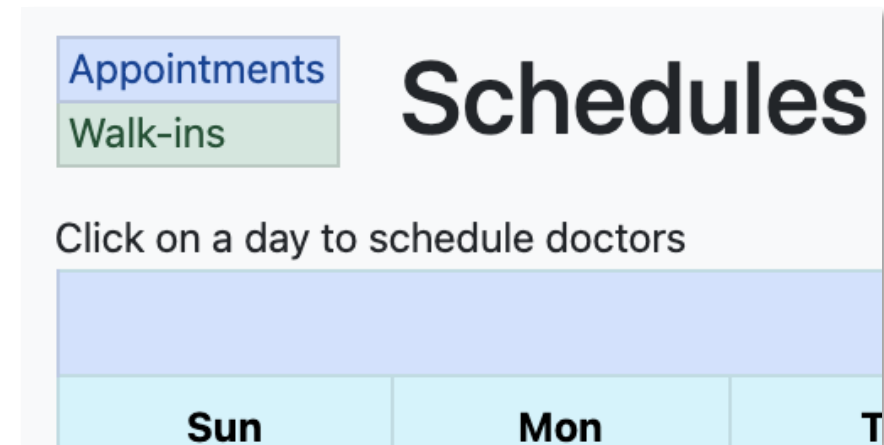
CHALLENGES AND SOLUTIONS – CLICK CLINIC

- Challenge: Visual scheduler for patients with their primary care physician

- Solution: A whole month calendar view with time slot availability based on doctor schedules

CHALLENGES AND SOLUTIONS – CLICK CLINIC

- Challenge: Admins have to manage scheduling for many doctors

- Solution: Custom created calendar with views for admins and patients

- Admin CRUD from within the calendar

| Appointments |
| Walk-ins |

Schedules

Click on a day to schedule doctors

Sun	**Mon**	**T**

15	16	17	18	19	20
Tor, Doc ②	Tor, Doc ④	Tor, Doc **delete**	Tor, Doc ⑤	Tor, Doc ②	

CHALLENGES AND SOLUTIONS – CLICK CLINIC

CHALLENGES AND SOLUTIONS – CLICK CLINIC

- Challenge: Minimalist and easily adaptable styling

- Solution: Bootstrap framework

CHALLENGES AND SOLUTIONS – CLICK CLINIC
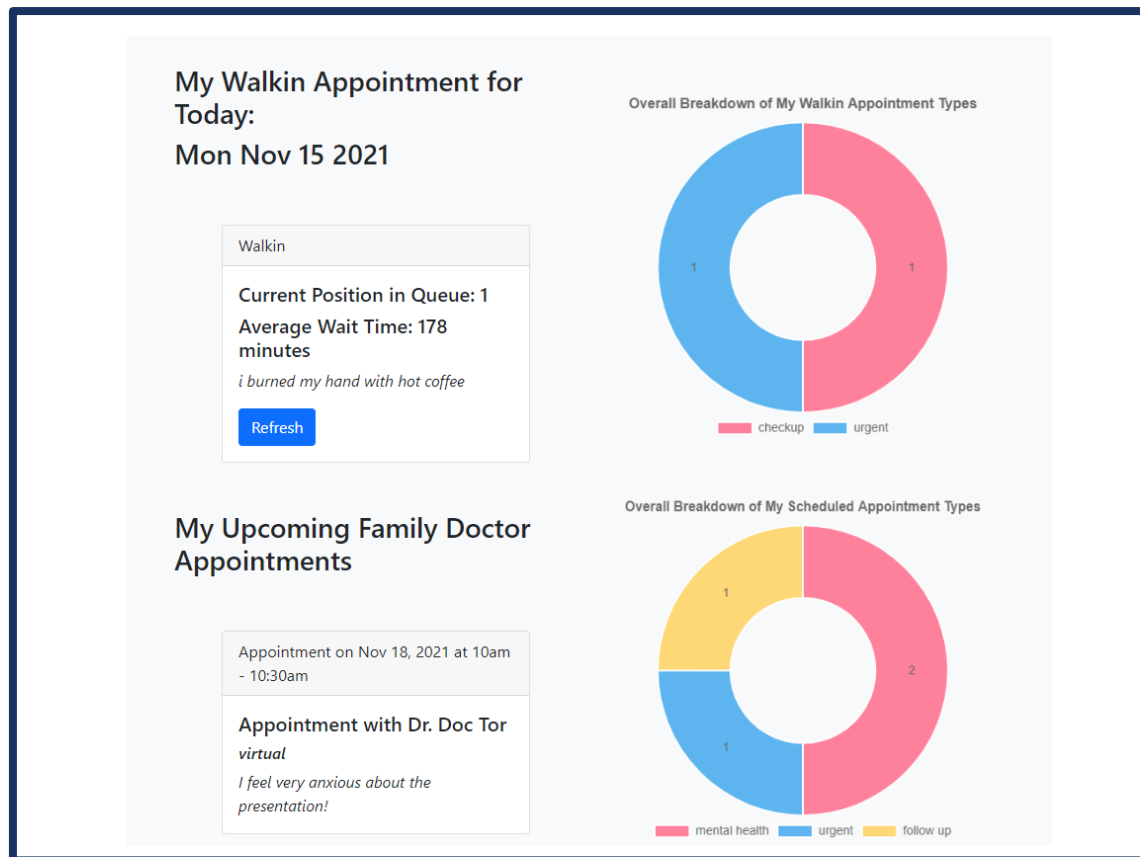
- Challenge: Retrieving relevant data that needs to be presented in an at-a-glance format.

- Solutions: Dashboards with metrics and dynamic charts via Chart.Js for all 3 user roles

```php
function findQueuePosition($walkinId) {
    $rows= DB::query("SELECT id FROM walkins WHERE activeStatus = 'ACTIVE'
    AND DATE(queueStart) = CURRENT_DATE() ORDER BY priority, id;");
    $count = 0;
    foreach ($rows as &$row){
        $count += 1;
        if($row['id'] == $walkinId) {
            return $count;
        }
    }
    return $count;
}
```

CHALLENGES AND SOLUTIONS – CLICK CLINIC

- Chart JS
  - CDN
  - HTML canvas element
  - Chart Object
  - Pass x, y data as arrays
  - Customized formatting – plugin libraries
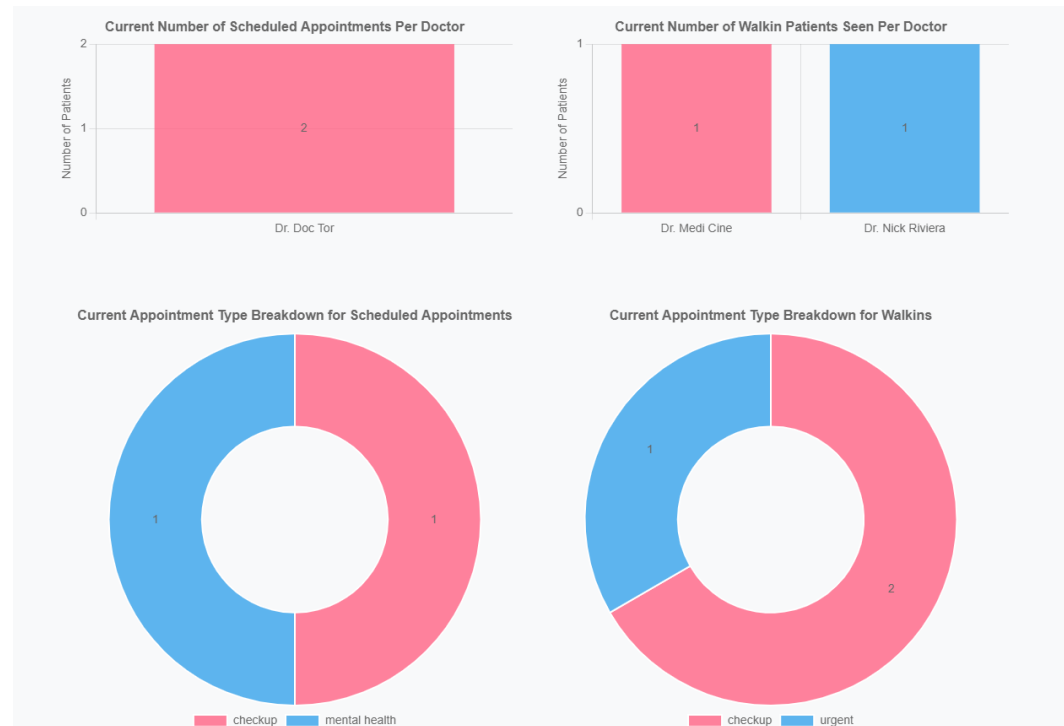

```
<script src="https://cdn.jsdelivr.net/npm/chart.js"></script>
<script src="https://cdn.jsdelivr.net/npm/chartjs-plugin-datalabels@2.0.0-rc.1/dist/chartjs-plugin-datalabels.min.js"
integrity="sha256-Oq8QGQ+hs3Sw1AeP0WhZB7nkjx6F1LxsX6dCAsyAiA4=" crossorigin="anonymous"></script>
```

CHALLENGES AND SOLUTIONS – CLICK CLINIC
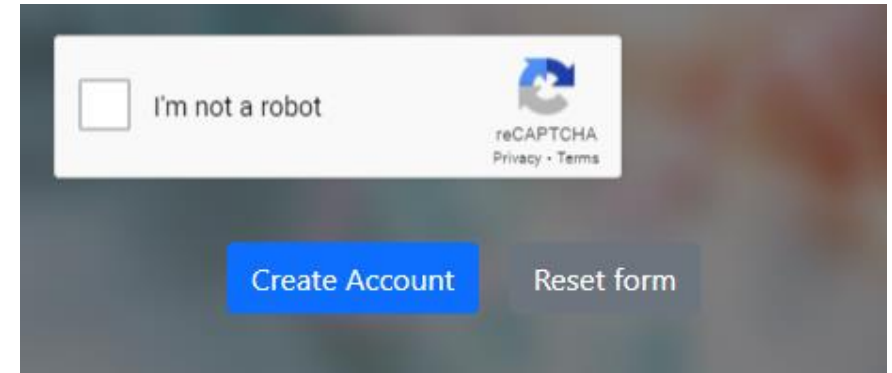
- Challenge: Security is necessary given the sensitive nature of medical data

- Solution: reCAPTCHA v2 to guard against bad actors


```html
<div class="g-recaptcha" data-sitekey="6Ld7EwAdAAAAADa4JWcc1Z0SpueLGITlQumrFp3p"></div>
<div class="row g-3 justify-content-center row-cols-auto m-3">···
</form>
<script src="https://www.google.com/recaptcha/api.js" async defer></script>
```

```php
$secretKey = '6Ld7EwAdAAAAAOhGtpy2rOA6wD8XEVkmIDNn--fw';
// post request to server
$url = 'https://www.google.com/recaptcha/api/siteverify?secret=' . urlencode($secretKey) .  '&response=' . urlencode($_POST['g-recaptcha-response']);
$apiResponse = file_get_contents($url);
$responseKeys = json_decode($apiResponse, true);

// should return JSON with success as true
if (!$responseKeys["success"]) {
    $errorList[] = "Recaptcha failed";
}
```

CHALLENGES AND SOLUTIONS – CLICK CLINIC

Current Cron Jobs

Minute	Hour	Day	Month	Weekday	Command	Actions
0	0	*	*	*	/usr/local/bin/ea-php74 /home/cp5016/clickclinic.fsd01.ca/cron-daily.php	✏ Edit 🗑 Delete

- Automatic emails sent to patients the day before their appointment (with link to Zoom meeting for virtual)

- Cron Job to automatically execute email script daily

Click Clinic Appointment Reminder

Click Clinic
Mon 2021-11-15 3:24 PM
To: Post, Kathryn

Click Clinic

Kate Post

You have an appointment scheduled tomorrow at 11am - 11:30am with Dr. tori

Follow this link to join the virtual meeting for your appointment
Link: https://us05web.zoom.us/j/86740495964?pwd=U3NiQmxsUW80cGNWbTNPTXR5K2FuZz09

Reply | Forward

CHALLENGES AND SOLUTIONS – CLICK CLINIC

The meeting is scheduled for 25-Nov-2021.

Start: 8:30 AM

Appointment at Click Clinic

Appointment Information

Description: I'm too sad

Type: virtual

Expected Time: 11am - 11:30am

Appointment Type: mental health

Zoom Link: Start Zoom Call

Appointment in Progress   Patient File

- Challenge: Doctor to patient virtual communication

- Solution: Zoom API and integration

WHAT WE LEARNED – CLICK CLINIC

- Automatic Appointment Reminder Emails with SendGrid, Cron Jobs, and Zoom APIs along with the Guzzle and Firebase Libraries

WHAT WE LEARNED – ZOOM JWT AND API KEYS

Click Clinic

Intent to publish: No   Account-level app   JWT credentials

App credentials

API Key

| 7oJVxIxaSN20NpyT5H0Kyw | Copy |

API Secret

| ••••••••••••••••••••••••••   👁 Copy | Regenerate |

IM Chat History Token

| eyJhbGciOiJIUzI1NiJ9.eyJpc3MiOiJhX2... Copy | Regenerate |

View JWT Token ⌄

```php
use \Firebase\JWT\JWT;
use GuzzleHttp\Client;

define('ZOOM_API_KEY', '7oJVxIxaSN20NpyT5H0Kyw');
define('ZOOM_SECRET_KEY', 'API_KEY_HERE');

function getZoomAccessToken() {
    $key = ZOOM_SECRET_KEY;
    $payload = array(
        "iss" => ZOOM_API_KEY,
        'exp' => time() + 3600,
    );
    return JWT::encode($payload, $key);
}
```

WHAT WE LEARNED – ZOOM MEETINGS

```php
function createZoomMeeting($start_time, $topic)
{
    $client = new Client([
        // Base URI is used with relative requests
        'base_uri' => 'https://api.zoom.us',
    ]);

    $response = $client->request('POST', '/v2/users/me/meetings', [
        "headers" => [
            "Authorization" => "Bearer " . getZoomAccessToken()
        ],
        'json' => [
            "timezone" => "America/Montreal",
            "topic" => $topic,
            "type" => 2,
            "start_time" => $start_time,
            "duration" => "30",
            "password" => "123456"
        ],
    ]);

    $data = json_decode($response->getBody());
    return ['url' => $data->join_url, 'password' => $data->password, 'meetingId' => $data->id];
}
```

type	meetingId	1
virtual	86740495964	

WHAT WE LEARNED – SENDGRID TEMPLATING

Click Clinic

{{first_name}} {{last_name}}

You have an appointment scheduled tomorrow at {{time}} with Dr. {{doc_name}}

{{virtual}}
{{link}}

```php
if ($appointment['type'] == 'virtual') {
    $meetingInfo = getZoomMeeting($appointment['meetingId']);
    $time = timeSlots($appointment['timeSlot']);
    $tos[] = new To(
        $appointment['email'],
        $appointment['firstName'],
        [
            'first_name' => $appointment['firstName'],
            'last_name' => $appointment['lastName'],
            'doc_name' => $appointment['docLastName'],
            'time' => $time,
            'virtual' => "Follow this link to join the virtual meeting for your appointment",
            'link' => "Link: " . $meetingInfo['join_url']
        ]
    );
```

```php
$email = new Mail(
    $from,
    $tos
);
$email->setTemplateId("d-1decf7f35a18405dbca02a5518b8c575");
$sendgrid = new \SendGrid('SG.kLZK3_2NRsCfVC54fV45zg.2x-EZySr
try {
    $response = $sendgrid->send($email);
```

WHAT WE LEARNED – CRON JOB

Current Cron Jobs

Minute	Hour	Day	Month	Weekday	Command	Actions	
0	0	*	*	*	/usr/local/bin/ea-php74 /home/cp5016/clickclinic.fsd01.ca/cron-daily.php	✎ Edit	🗑 Delete

```php
$log->debug("Daily scheduler run started");

$tomorrow = date_format(new DateTime('tomorrow'), "Y-m-d");
$result = DB::query("SELECT p.firstName as firstName, p.lastName as lastName, timeSlot,
            d.lastName as docLastName, bookingslots.id as bsId, `type`, p.email as email, meetingId
        FROM bookingslots INNER JOIN users as d ON bookingslots.doctorId = d.id
        INNER JOIN users as p ON p.id = bookingslots.patientId WHERE appointmentDate = %s", $tomorrow);

$from = new From("admn1clickclinic@gmail.com", "Click Clinic");
```

WHAT WE LEARNED – CLICK CLINIC

- Form Validation with the Respect/Validation library

```
composer require respect/validation
```

■

WHAT WE LEARNED – `use Respect\Validation\Validator as v;`

```php
476   function validateDOB($dob){
477       // must be before today, must be after 150 years ago
478       $valid = v::date()->maxAge(150)->minAge(0)->validate($dob);
479       if($valid){
480           return $dob;
481       }
482       return $valid;
483   }
```

```php
469   function validateRole($role){
470       if(v::noneOf(v::equals('patient'),v::equals('doctor'),v::equals('admin'))->validate($role)){
471           return false;
472       }
473       return $role;
474   }
```

```php
if(!v::noneOf(v::uppercase(), v::lowercase(), v::alpha(), v::digit())->length(8, 72)->validate($password)){
    $log->debug("Password ".$password."invalid");
    return false;
}
```

FUTURE WORK

- Implement Zoom SDK

- Enhance security with 2FA (Google)

- More calendar views

- Translation to French (Google translation API)

SUMMARY

Created system for patients, admins, doctor to manage and schedule medical appointments

Accomplished many of the goals in our proposal

THANK YOU

QUESTIONS?

400 commits