



# 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

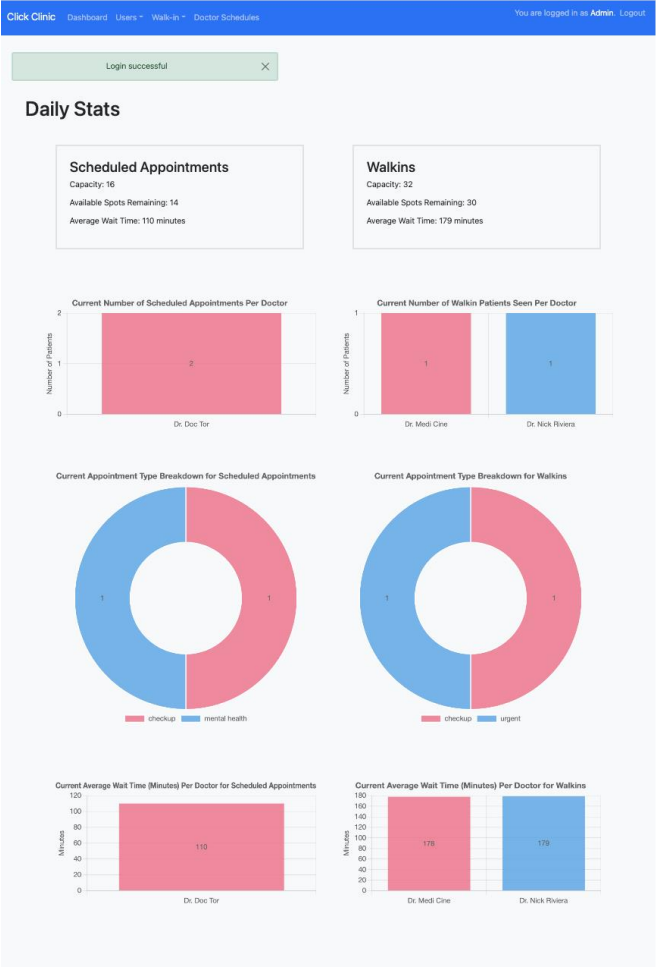


Security

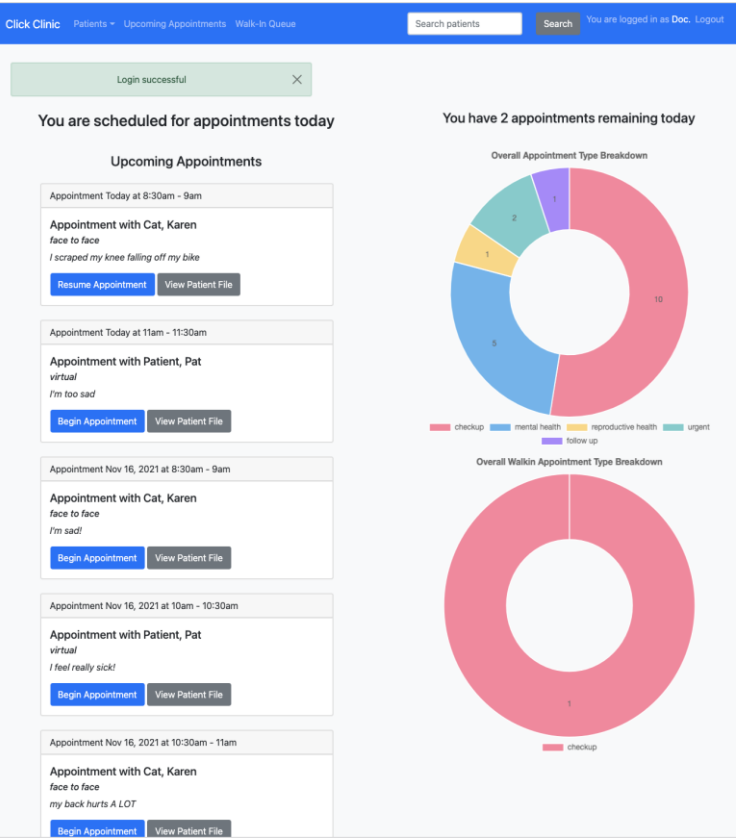


Relevant metrics and  
data visualization

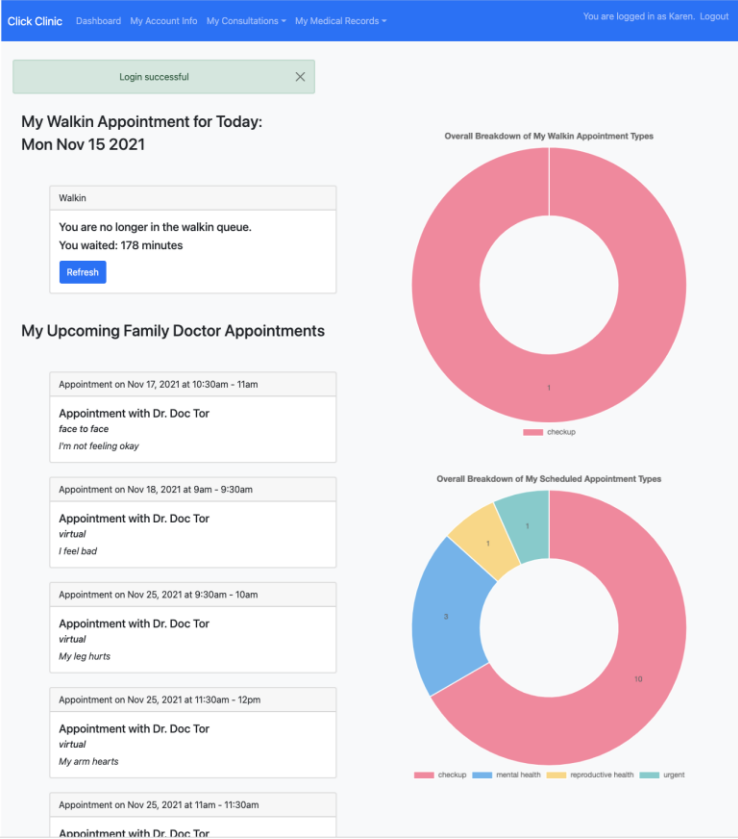
# Administrator



# 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 Cine, M 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				

## Book an Appointment

2021-11-18

Doctor

Patient

Time Slot :

Choose a doctor

choose a time slot

Appointment Type :

Presence :

checkup

face to face

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

Reason :

Choose File

No file chosen

Please provide a brief description of the uploaded file :

Book Appointment

2021-11-18

## Schedule a doctor

Select a doctor

Dr.Cine, I

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

# 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

x

Search

Last Name	First Name	DOB	Family Doctor	Patient File
Patient	Patrick	2021-10-20	Tor	<a href="#">Patient File</a>
Cat	Karen	1959-05-04	Tor	<a href="#">Patient File</a>

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

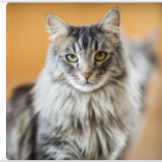
Appointment 2021-Nov-16 at 8:30am - 9am

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

Referral History

Upload a file to this patient's file

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	<a href="#">upcoming</a>	
2021-Nov-25 9:30am - 10am	checkup	My leg hurts	<a href="#">upcoming</a>	
2021-Nov-25 11am - 11:30am	checkup	feeling weird	<a href="#">upcoming</a>	
2021-Nov-25 11:30am - 12pm	checkup	My arm hearts	<a href="#">upcoming</a>	

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	<a href="#">Download</a>	A cat pic
2021-11-15	test	<a href="#">Download</a>	

Files uploaded by the patient

Upload Date	File description	File
2021-11-14	A cat	<a href="#">Download</a>
2021-11-14	pdf file1	<a href="#">Download</a>
2021-11-14	sdfkjsdfjlkdsf	<a href="#">Download</a>



# 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 <div>Appointments Available!</div>	17	18 <div>Appointments Available!</div>	19 <div>Appointments Available!</div>	20
21	22 <div>Appointments Available!</div>	23 <div>Appointments Available!</div>		25 <div>Appointments Available!</div>	26 <div>Appointments Available!</div>	27
28	29 <div>Appointments Available!</div>	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

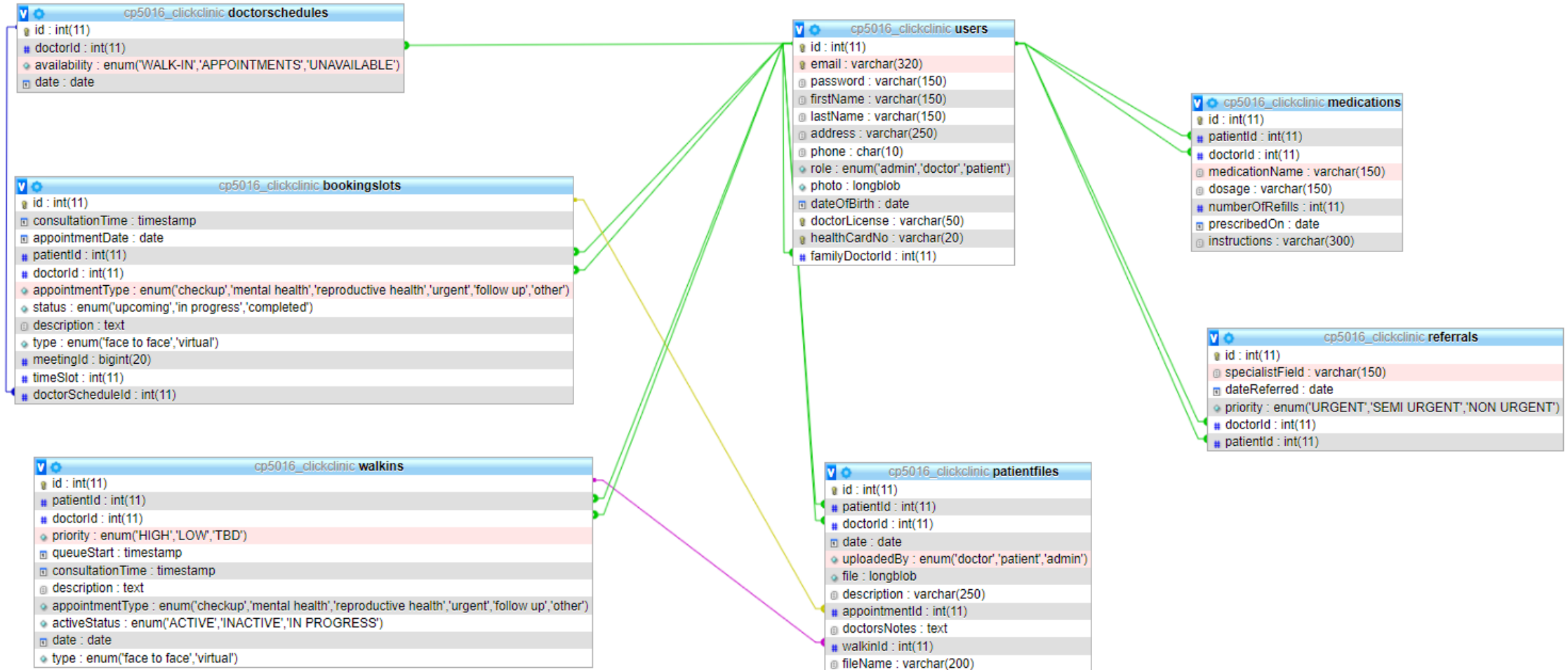
1

## My Upcoming Appointments

		Appointment						File			
Date	Time	Doctor	Type	Description	Type	Status	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

15

Appointments Available! 14

choose a time slot

8am - 8:30am

9am - 9:30am

9:30am - 10am

10am - 10:30am

10:30am - 11am

11:30am - 12pm

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 :  
2021-11-15 at 10am - 10:30am

Appointment Type :  
mental health

Reason :  
Big presentation stress!

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

- Challenge: Visual scheduler for patients with their primary care physician
- Solution: A whole month calendar view with time slot availability based on doctor schedules

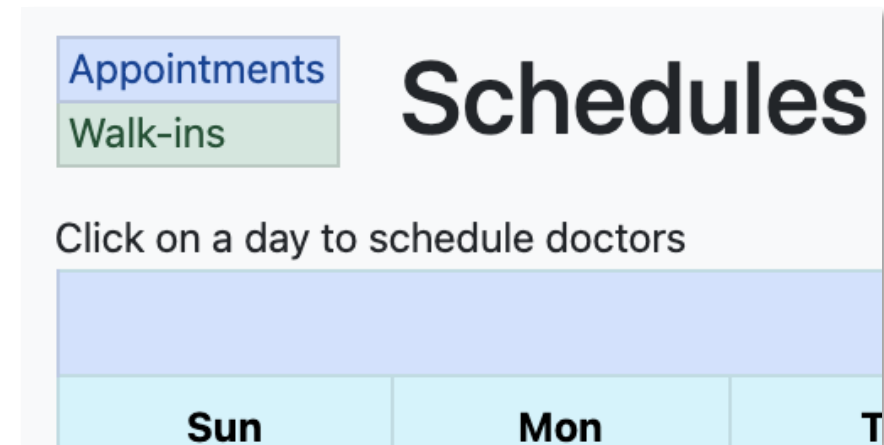
## My Upcoming Appointments

Date	Time	Doctor	Appointment Type	Description	Type	Status	File Description	File Name	File	
2021-11-17	10:30am - 11am	Dr.Doc Tor	mental health	I'm not feeling okay	face to face	upcoming	NA	NA	NA	Upload File
2021-11-18	9am - 9:30am	Dr.Doc Tor	reproductive health	I feel bad	virtual	upcoming	NA	NA	NA	Upload File Zoom Link



# 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



15	16	17	18	19	20
Tor, Doc	Tor, Doc	Tor, Doc delete	Tor, Doc	Tor, Doc	

# CHALLENGES AND SOLUTIONS – CLICK CLINIC

## Book an Appointment

2021-11-16

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

Reason :

Please provide a brief description of the uploaded file :

Book Appointment

2021-11-19

## Schedule a doctor

Select a doctor

Dr.Cine, M

Schedule Type

Walk-in

Schedule

## Appointments List

Dr. Doc Tor

Cat, Karen - 8am - 8:30am

Delete

Cat, Karen - 10am - 10:30am

Delete

## Appointments List

Dr. Doc Tor

no appointments scheduled

Delete Schedule

# CHALLENGES AND SOLUTIONS – CLICK CLINIC

Click Clinic Patients ▼ Upcoming Appointments Walk-In Queue

Search patients

Search

You are logged in as Doc. Logout

## Appointment Notes

File Edit View Format


↶ ↷ Paragraph ▼ **B** *I* ≡ ≡ ≡ ≡ ≡ ≡ ≡ ≡

P

POWERED BY TINY

### Create prescription

Medication : Prescribed date :

dd-----yyyy 

Dosage : Number of refills :

0


Medication instructions :

Create prescription

Reset form

### Create referral

Specialization : Date referred : Referral priority :

dd-----yyy.  Not urgent ▼

Create referral

Reset form

End appointment

- Challenge: Minimalist and easily adaptable styling
- Solution: Bootstrap framework

# CHALLENGES AND SOLUTIONS – CLICK CLINIC

## My Walkin Appointment for Today: Mon Nov 15 2021

Walkin

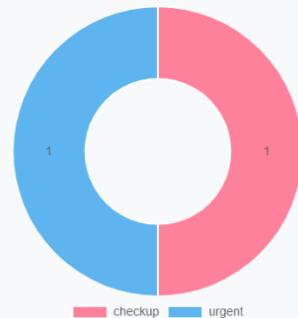
Current Position in Queue: 1

Average Wait Time: 178 minutes

*i burned my hand with hot coffee*

Refresh

Overall Breakdown of My Walkin Appointment Types



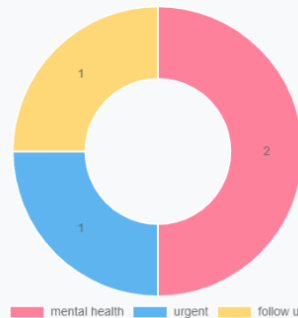
## My Upcoming Family Doctor Appointments

Appointment on Nov 18, 2021 at 10am - 10:30am

Appointment with Dr. Doc Tor virtual

*I feel very anxious about the presentation!*

Overall Breakdown of My Scheduled Appointment Types

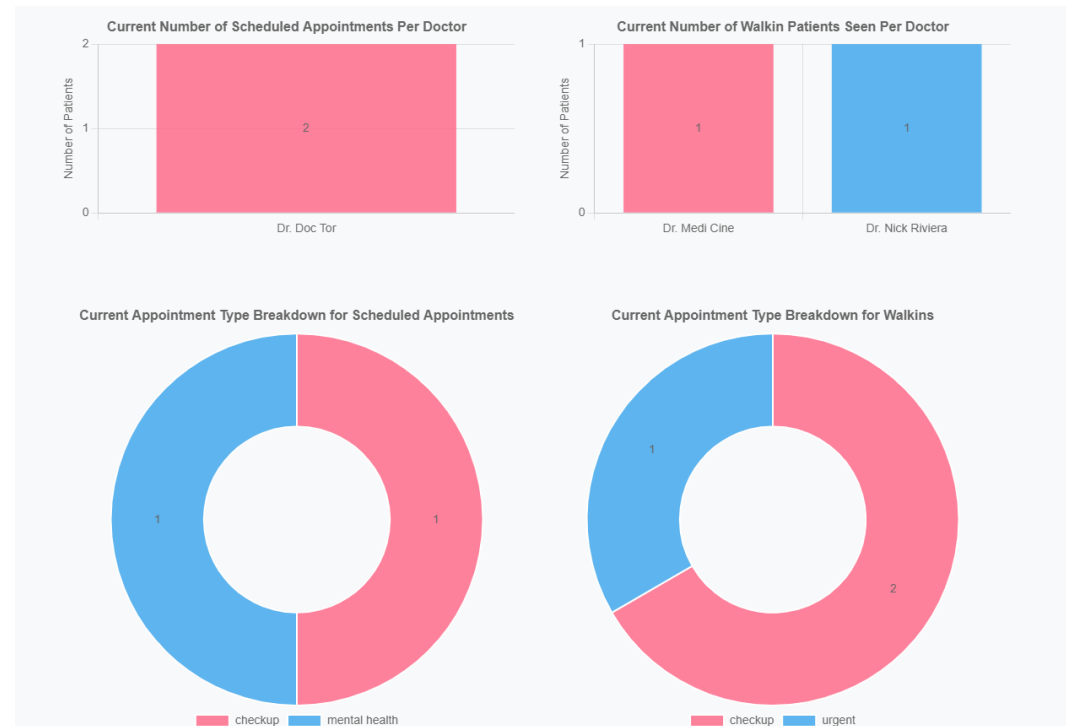


- Challenge: Retrieving relevant data that needs to be presented in an at-a-glance format.
- Solutions: Dashboards with metrics and dynamic charts via Chart.js for all 3 user roles

```
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

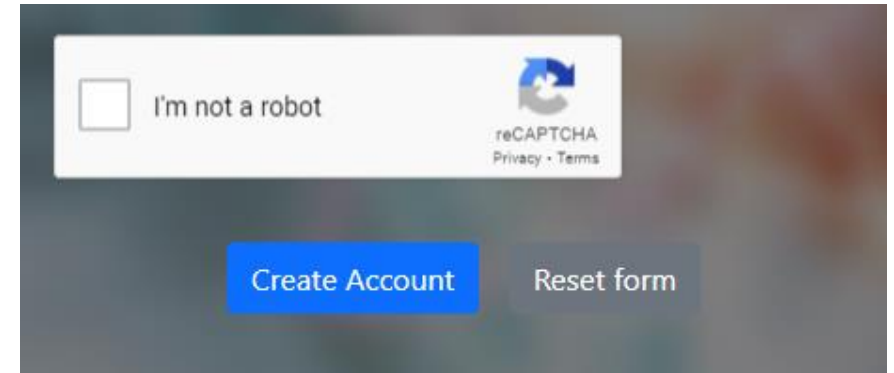
- Chart JS
  - CDN
  - HTML canvas element
  - Chart Object
  - Pass x, y data as arrays
  - Customized formatting – plugin libraries



```
<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="sha256-0q8QGQ+hs3Sw1AeP0WhZB7nkjx6F1LxsX6dCAyAiA4=" 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



```
<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>  
<div class="text-end">
```

```
$secretKey = '6Ld7EwAdAAAAADa4JWcc1Z0SpueLGITlQumrFp3p';  
// 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	*	*	*	<code>/usr/local/bin/ea-php74 /home/cp5016/clickclinic.f sd01.ca/cron-daily.php</code>	<a href="#">Edit</a> <a href="#">Delete</a>

- 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

- Challenge: Doctor to patient virtual communication
- Solution: Zoom API and integration

## 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

## 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

Intend 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 ▾

```
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

```
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}}

```
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']  
        ]  
    );  
}
```

```
$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	<a href="#">Edit</a> <a href="#">Delete</a>

```
$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;

```
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 }
```

```
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 }
```

```
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