

The IBM IV case management system facilitates client appointments and application submissions being processed at its points of operations or centers.

It is a Laravel-based web application site, with MySQL as database, built to manage customizations flexibly within short development time. The site and its infrastructure components are hosted on Microsoft Azure, where scalability, stability, and security have been prioritized while optimizing on costs and maintenance.

Using the application will allow an agent to:

Register/Manage/Track all applications for applicants (case management).



Cult

Register/Manage/Track all appointments for applicants (while allowing client-facing form for scheduling appointments).

Report about all the above (dashboards, as well as allowing data export for visualization tools).

SCALABILITY AND FLEXIBILITY

The web application has been developed on Laravel, which is best fit for the requirements of the solution and for rapid but flexible development. For faster development and integration of better features, Backpack for Laravel has been used, which is known for its range of packages appropriate for customizing admin panels and forms on the application site.

The application can cater to multiple locations (or centers), with the possibility to add more. Access can be granted to designated agents and managers from anywhere depending on location (or IP address) and through the requested URL paths (e.g., each appointment page for each center has their own URL).

Being on Azure, the whole solution is scalable to accommodate increased demands on resources and capacity, as well as on security and geo-location requirements.

The modular approach has been done for the development of the application and its features. Each module can be adjusted with minimal impact to the others. Currently, it has two main modules for case management and for scheduling appointments.

The possibility for integration with other systems is available depending on the kind of integration needed.

AVAILABILITY OF MULTIPLE USERS

The application is designed to cater to multiple agents and roles for multiple centers. Access and display of information depends on the assigned permissions and level of access. An agent or manager can be assigned to a single center or even to multiple centers—which can be particularly useful for a manager who needs oversight to different centers.

Additional centers can certainly be added and can still accommodate information fields and workflows unique for the center.

Access is available for a registered user and IP address. Access permissions are also granular, where many of the application's features can be selected for access based on default assignments or customized based on the additional roles of the user.

APPOINTMENT TO CASE MANAGEMENT

- The case management lifecycle starts from the scheduling of an appointment by a beneficiary. The interface can be customized as requested, including logos/colors for different projects/donors/government partners.
- The details asked for when creating an appointment can certainly be expanded. It is also possible to include a self-assessment questionnaire to guide beneficiaries either from the appointment scheduling page itself or on the notification email.
- The details added by the beneficiary requires further verification by the beneficiary sent via email before confirming their appointment schedule. The system will only accept verified response from a unique email address, while limiting the number of allowable appointments slots per request and limiting the time for creating the next request.
- When an appointment is completed (status is set to "Appointment Completed"), the same beneficiary's details will be used to populate the required data on the application case.

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Figure 2 Appointment Creation to Application Case Creation



- To further verify and validate the request, this will be checked against existing and previous requests.
- If beneficiary data is already known and registered on the system, it is possible to further check against this data to further verify and validate the appointment and application case during their creation.
- In addition, there are also server side pre- and post- submission validation methods implemented to circumvent exploits, particularly those that aim to bypass validation to the server.
- For walk-in applications, if intake is deemed valid and completed, it is possible to create an application case within the case management module.
- Sample screenshots available to agents (IOM system users):

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Figure 3 Appointments List

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	5	41423010000441	Additional documents received +	KWAC - Ulaanbaatar	CHIMED SUVDMAA	Mongolia	E2587741	Female	27 Mar 1957	KHUD	UB			Single	International Trade		KVAC Berlin, Paris - Visa Applic	60 EUR	Actions *
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SYSTEM SECURITY

The development of the application has undergone stringent inspection with IOM Information Security and done in compliance with IOM ICT security rules and guidelines.

Infrastructure security (including backup) will be configured through available mechanisms and according to standard practices and available services for securing resources (service components and databases) on the hosting platform (i.e., Azure). In addition, access to the application site will only be allowed to known Agents/Staff and Subnets.

Authentication and hierarchical access levels are also designed into the application. This will require AD Authentication for the staff. Application features are only available to users according to their defined CRUD roles.

Link to embedded forms (Schedule Appointment Form) from informational sites to application site will be secured to only allow specific and necessary traffic. Laravel has documented security methods that have been implemented, when applicable, during development within this framework. And on Backpack for Laravel, private security audits are regularly done and any vulnerabilities are soon fixed when found.

DATA SECURITY

Data hierarchy and controls for secret, confidential, restricted (sensitive, personal) information have been listed and documented—including for Service Accounts & Credentials, SSO Authentication, Application Data, and Appointment Data.

In addition, high availability requirements and high integrity are also listed as required for each type of information.

IDENTITY AND ACCESS MANAGEMENT

Access to the application site will require AD SSO Authentication for the agents, checked against their IOM Azure AD account. Application features are managed and only available according to defined CRUD roles (Read, Create, Update, Delete) and well documented. CRUD roles also determine level of access to features, including administration. Access for new agents will be only granted if Programme Management and Team Leaders within respective centers validates the request.

Accounts will be disabled in a timely fashion following confirmation from Programme Management and Team Leaders on the event of transfer, termination, or job change.

NETWORK SECURITY

Access to the application site (including all networks and environments) will only be allowed to registered staff and subnets through IP blocklisting and Path-filtering.

Access to hosted services (in Azure) will be through available connection mechanisms provided by the hosting platform managing team. Intrusion prevention is employed through configured Azure network security features and policies, including hardened firewall rules and server-side security.

To address instances when the system gets overwhelmed through network type attacks (such as directing high volumes of traffic and persistent requests), denying access to the system, and making the site inaccessible, the following will be employed:

- Immediate upgrade of server resources and capacity when the need has been identified.
- Vulnerability scans and simulations to determine additional security measures to be added.
- Suspected IP addresses will be immediately blocked following network scans; rate limiting rule to the front door policy added.





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> 200.113.238.49, 147.243.169.148	17,661
> 200.113.230.152, 147.243.169.148	17,410
> 190.115.175.209, 147.243.183.38	17,367
> 200.113.214.64, 147.243.169.148	13,218
> 45.4.115.26	13,059
> 179.34.89.109	11,719
> 190.115.174.59, 147.243.183.38	10,601
> 190.115.175.149, 147.243.183.38	10,062
> 200.113.251.23, 147.243.169.148	9,594
> 2804:214:8138:4ed8:c8f1:5ae4:68fa	f5a6 9,070
> 190.115.174.32, 147.243.183.38	9,011
> 200.113.230.222, 147.243.169.148	8,774
> 190.115.177.111, 147.243.183.38	8,672
> 190.115.174.111, 147.243.183.38	8,511
> 200.113.230.152, 147.243.189.12	8,032
> 200.113.214.103, 147.243.169.148	8,015
> 200.113.214.190, 147.243.169.148	7,942
> 200.113.234.161, 147.243.169.148	7,874
> 200.113.230.157, 147.243.189.12	7,744
> 200.113.248.205, 147.243.169.148	7,436
> 190.115.183.150, 147.243.183.38	7,108
> 138.59.202.26	6,868

Figure 5 Requests Monitoring (indicating high number of requests)

Figure 6 Monitoring requests count to identify suspected IP addresses.

APPLICATION SECURITY

- The application is custom coded following best practices for development and security. It has also been scanned and vetted following thorough inspection by the IOM Information Security team.
- The whole solution is independent, with no interconnection to other IOM corporate systems or databases. Being a separate application and a service, this can address requirements for further data control and ownership.
- SSL for data in motion (Encrypted Transmission) and Database encryption for data at rest.
- SSL will always secure data in transit, even if the users will be mainly internal staff. When providing links to embedded forms (such as the appointment forms) on informational sites to application site, this will be secured to only allow specific and necessary traffic.
- Audit trails of user actions in the application are included where any changes can be immediately identified and reverted as needed.
- Implemented validation mechanisms include email validation, QR-code validation, and official identity document submissions. (Future improvements will include AI-assisted validation).
- System logs are available for administrators. Activity notifications based on agent role and access, and activity history for an appointment or application case for tracing updates or revisions are also available.

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Announcements	4 May 2023, 12:13	silnor beljour Appointment Cancelled. Additional message here	Dismiss
Authentication ·	4 May 2023, 12:12	silnor beljour Appointment Cancelled. Additional message here	Dismiss
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Figure 9 Application Case Revisions
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• Automated data purging is in development. Nonetheless, this can be manually done via bulk delete button for filtered entries, e.g., selected date range. (Available only to those with the authorized role.)

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KVAC - Ulaanbaatar	Appointment Not Verified	nomindari L	10 May 2023	14:00:00	Mongolia	Single	Tourism	nikhaasuren@iom.int	+97688079665	PE0000	Female	9 Oct 1987	UB	UB	Actions *
KWAC - Ulaanbaatar	Appointment Confirmed	BADAMSUREN BATTUR	5 May 2023	14:00:00	Mongolia	Single	Tourism	via@iom.int	88159772	E123456	Female	4 Dec 1998	MONGOLIA	ULANBAITAR	Actions *
KVAC - Ulaanbaatar	Appointment Not Verified	DOLGORSUREN KH	4 May 2023	15:00:00	Ireland	Single	Special Talent	dihukhakh@iom.int	99106615	£3511351	Female	5 Nov 1989	#222, Khanbogd Residence	Ulaanbaatar, Mongolia	Actions *
KVAC - Ulaanbaatar	Appointment Not Verified	ENKHJ BADR	12 May 2023	12:12:00	Mongolia	Single	Tourism	enbadralgiom.int	12121212	E1212121	Female	12 Dec 2012	SBD	UB	Actions *
KWAC - Ulaanbaatar	Appointment Confirmed	Khajidsuren Otgonbayar	10 May 2023	14:30:00	Mongolia	Single	Tourism	okhajidsuren@iom.int		e4555555	Female	24 May 1992			Actions *
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Figure 10 Delete button and bulk selection for filtered entries.

WEB SECURITY

- Web security for the application site will generally follow the appropriate security practices for the available services and components on the hosting platform.
- Only authorized administrators will have access to connect to the application site's hosted services and components.
- Server side pre- and post- submission inspection methods have been implemented to prevent setting custom time/date value within console value, sent via html inspection without validation to the server.

DATABASE SECURITY

- Database security for the application site will generally follow the appropriate security practices for the available services and components on the hosting platform—including encryption.
- Only authorized administrators will have access to connect to the application site's database/s.
- For monitoring health and performance, including logs, this will be done with available Azure monitoring tools.

BACKUP, LOGGING, AND DISASTER RECOVERY

Backup services will be provided via Azure Backup Service. Systems logging is enabled and will be monitored through existing health dashboards and application logs (Azure Monitor, Azure Sentinel). Azure Site Recovery will be used for disaster recovery.

