



# **Cloud CRM solution**

**integrated with a web portal for  
a scrub suit vending machine supplier**

# About

WaveAccess is a results focused software development company that provides high quality software outsourcing services to hundreds of emerging and established companies globally. We use our technical expertise to increase business efficiencies, optimize slow or unreliable systems, recover projects that have gone off track and bring ambitious ideas to life.

**22**

years of delivering  
successful outcomes  
for customers

**800+**

talented and passionate  
professionals

**8**

R&D centers  
and regional  
offices

**17+**

industry verticals  
from banking  
to healthcare

**500+**

successful projects  
delivered and counting

**96%**

customer  
satisfaction index

## Awards and Recognitions



SCI-TECH AWARDS  
(ACADEMY OF MOTION PICTURE  
ARTS AND SCIENCES)

# Project Review

WaveAccess has partnered with ScrubPort, a US-based medical uniform supplier, to develop a comprehensive IT solution for providing disposable scrub sets for healthcare professionals at medical care facilities through vending machines. The solution connects the CRM system with user portals and with vending machine API, allowing for reliability, flexibility, and transparency.

## | Project requirements

In the US, it is a common practice for healthcare professionals to share working hours between two or more hospitals in one day. With schedules this busy, they sometimes do not have time to change their medical attire when leaving the hospital, increasing the risk of infection transmission outside the healthcare facility. Scrubs vending machines intended to minimize this risk, **making it possible for doctors to get a prepaid set of disposable scrubs right at the entrance to the hospital.**

Scrubs are relatively inexpensive, but are intended for use by healthcare professionals only – so the vendor had to **prevent their machines from issuing scrubs to non-professionals.** For this reason, a web portal was launched to register healthcare professionals as customers and manage their billing. When arriving at the hospital, the customer just enters their ID and PIN code at a vending machine and gets their sterile set of scrubs.

The vendor's sales department can **collect scrub sales data** from each machine in every hospital. Hospitals also need vending machine data to calculate their sales commission. Also, the pricing includes sales tax, which is different from state to state.

Therefore, the scrub vendor wanted a solution with the following requirements:

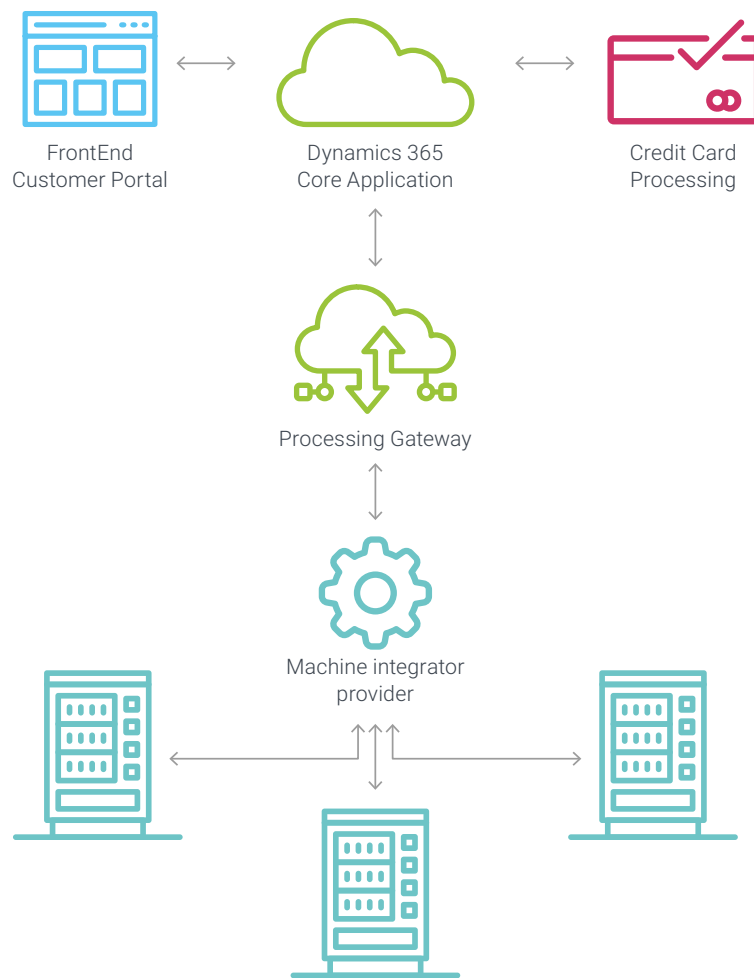
- Being able to add funds to the client's account balance through the online portal and/or automatic charging;
- At the hospital, allows the client to get a prepaid sterile scrubs using their client ID and PIN;
- Gathering sales data and making reports for all stakeholders: business owners, scrubs vendors, hospitals, and clients.

One of the main requirements was to **avoid in-house infrastructure**, so the solution was to be implemented in a cloud service.

## Architecture choice

At the start of the project, the vendor only had vending machines with an application programming interface (API). WaveAccess had to integrate them with a future CRM system, which was implemented using a special processing gateway. This gateway also acts as a safety net to conduct transactions in case the CRM system is not available.

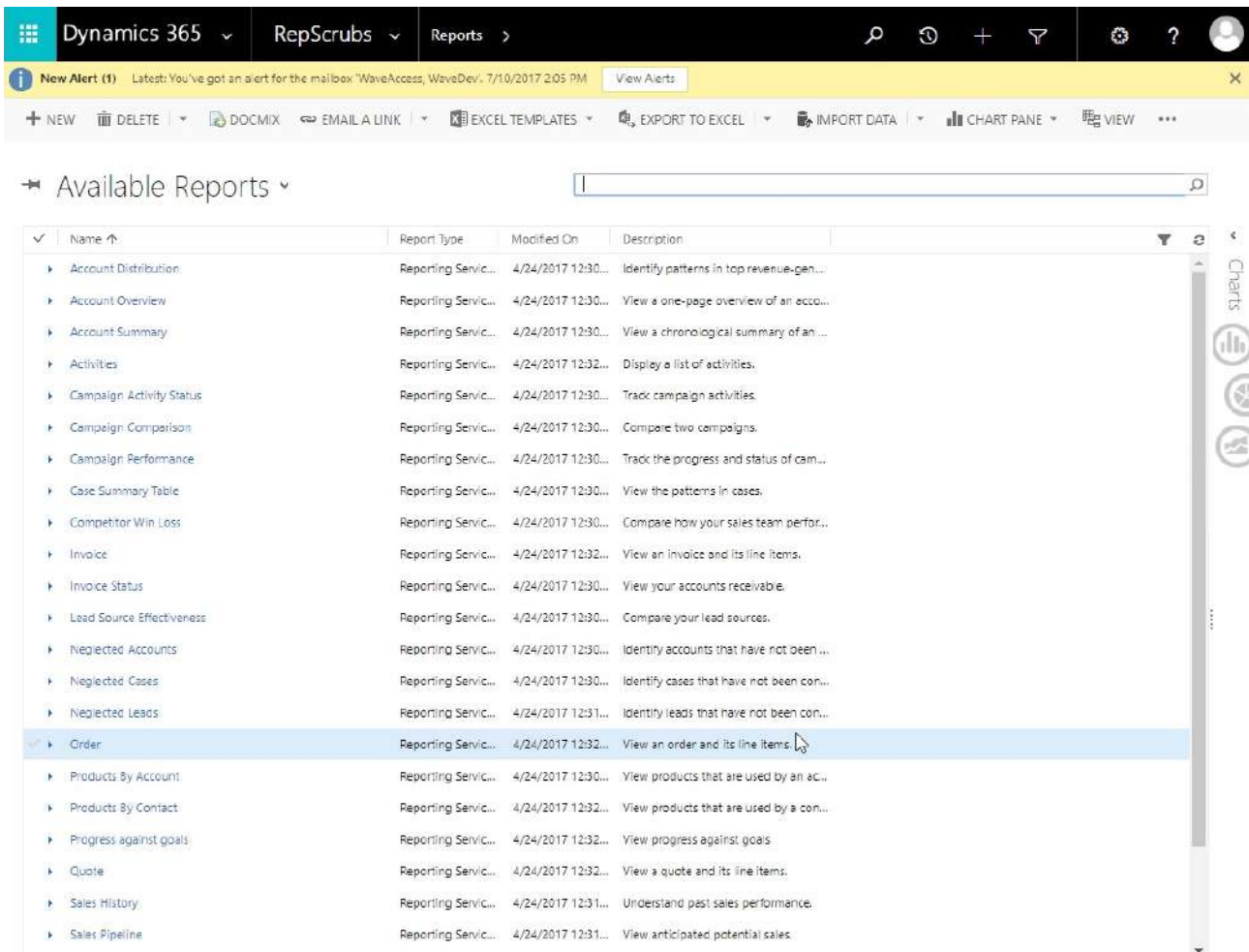
- **Microsoft Dynamics 365 CRM** is the main solution backend, it tracks all actions and entities – from user IDs to their transactions. Microsoft Dynamics 365 CRM hosts the entire system in the cloud in geographical proximity to the end user.
- **Processing gateway** is synchronized with the CRM almost in real time. The gateway interacts with the vending machine API through a machine integrator provider.
- **Front End Customer Portal** allows the healthcare specialists to register in the system and credit their account to purchase the scrubs. Automatic account topping is also available.



*Solution architecture*

# Solution Details

**Microsoft Dynamics CRM** is the main data storage for all system components. It helps the business track all accounts and gathers statistics.



*Microsoft Dynamics CRM user interface*

CRM system, along with the processing gateway, is integrated with payment systems. It uses a token-based system by Heartland API to track credit card transactions. It saves time and effort to undergo the yearly PCI (Payment Card Industry) certification required for companies that work with credit card holders.

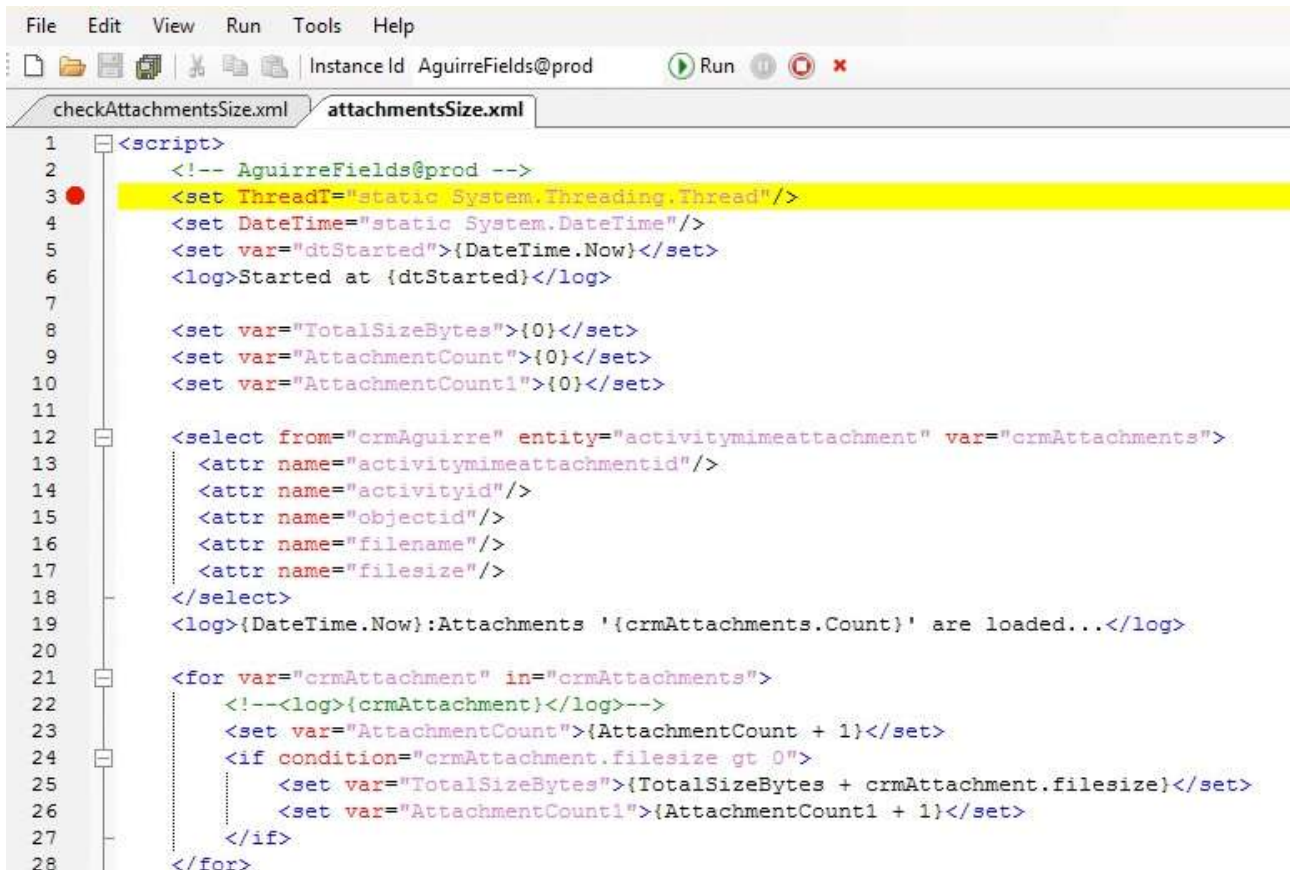
**Payment system token** is also stored in the CRM system, allowing the customer to make a purchase even if they have forgotten to refill the deposit. In this case the customer can call the operator, and based on their Client ID the operator will process the transaction and the customer will get their scrub set right away.

The payment system reduces the PCI DSS scope and saves on the yearly PCI validation: the only requirement is to fill in and submit the SAQ-A form.

**Gateway processing integration** allows vending machine API to interact with the intermediary database. The gateway authorizes user IDs, and serves as a fail

proof: even if the CRM system and/or web service is down, the transactions will still be processed.

**WaveAccess SyncIT** is a way to maintain a bi-directional synchronization between the CRM system and the cloud storage. SyncIT is WaveAccess's own product to synchronize different data sources. It uses its own script language, development environment with a debugger (IDEA) and an unified interface.



```
File Edit View Run Tools Help
InstanceId AguirreFields@prod Run
checkAttachmentsSize.xml attachmentsSize.xml
1 <script>
2 <!-- AguirreFields@prod -->
3 <set ThreadT="static System.Threading.Thread"/>
4 <set DateTime="static System.DateTime"/>
5 <set var="dtStarted">{DateTime.Now}</set>
6 <log>Started at {dtStarted}</log>
7
8 <set var="TotalSizeBytes">{0}</set>
9 <set var="AttachmentCount">{0}</set>
10 <set var="AttachmentCount1">{0}</set>
11
12 <select from="crmAguirre" entity="activitymimeattachment" var="crmAttachments">
13 <attr name="activitymimeattachmentid"/>
14 <attr name="activityid"/>
15 <attr name="objectid"/>
16 <attr name="filename"/>
17 <attr name="filesize"/>
18 </select>
19 <log>{DateTime.Now}:Attachments '{crmAttachments.Count}' are loaded...</log>
20
21 <for var="crmAttachment" in="crmAttachments">
22 <!--<log>{crmAttachment}</log-->
23 <set var="AttachmentCount">{AttachmentCount + 1}</set>
24 <if condition="crmAttachment.filesize gt 0">
25 <set var="TotalSizeBytes">{TotalSizeBytes + crmAttachment.filesize}</set>
26 <set var="AttachmentCount1">{AttachmentCount1 + 1}</set>
27 </if>
28 </for>
```

*Data synchronization. A WaveAccess SyncIT script*

When there is a lot of data, the vending machines will send a lot of requests (such as gateway open request for example). These requests are collected by the intermediary base, not the CRM system directly. The intermediary base is then synchronized with the CRM system via SyncIT scripts. The data transferred is client deposit balance, new price lists, new products, user blacklist, and so on.

SyncIT uses **Microsoft Application Insights** for analytics, performance counters, and logging. The apps are synchronized on a real-time basis.

**Microsoft Power BI** is used to make analytical reports and visualize data.

The user portal is implemented using the **ASP.NET MVC** technology, and it contains user, distributor, and point-of-sale administrator sections. The portal gives access to data stored in Microsoft CRM. Registering at this portal is mandatory, the credit card number is requested and checked on registration.

### Member Registration

**Personal information**

First name:  Middle name:  Last name:

**Company information**

Company name:  Hospital that mandated their enrollment:

**Address**

Street address 1:  Street address 2:

Country:  City:  State/Province:  Zip:

**Contact information**

Email address:  Cell phone number:

**Verification code**

Verification code will be sent to your cell phone or email. Please enter the code before continue registration.

Email

Cell phone

**Payment information**

Name on card:

Name on card:

Expiration date:  CVC:

Copy member address

Street address 1:  Street address 2:

Country:  City:  State/Province:  Zip:

**Membership ID & PIN**

Your membership ID: **PPTH-038631** Your PIN: **4701**

*New user registration page*

When registration is completed, the portal sends the account PIN and ID to the client by any preferred means (SMS or email). Using these PIN and ID, the user can now purchase scrub sets. The portal also allows for changing user data and contacting the support team to solve problems.

[Account management](#) / Transaction History

Transaction History

Date ▲	Transaction Type +	Description +	Amount =
09:21 pm 01/30/2017	Vending Purchases	LARGE REPSCRUBS 596267-RSLG	\$4.99
08:01 pm 01/30/2017	Membership fee	DOUBLE EXTRA-LARGE COVERALLS 596267-CA2X	\$3.99
07:52 pm 01/30/2017	Vending Purchases	LARGE REPSCRUBS 596267-RSLG	\$4.99
07:48 pm 01/30/2017	Vending Purchases	MEDIUM LABCOATS 596267-LCMD	\$2.99
07:46 pm 01/30/2017	Membership fee	EXTRA-LARGE LABCOATS 596267-LCXL	\$2.99
07:41 pm 01/30/2017	Membership fee	DOUBLE EXTRA-LARGE REPSCRUBS 596267-RS2X	\$4.99
07:35 pm 01/30/2017	Prepaid balance replenishment	SMALL REPSCRUBS 596267-RSSM	\$4.99
07:22 pm 01/30/2017	Credit Card Transaction credit/refund	SMALL REPSCRUBS 596267-RSSM	\$4.99
07:13 pm 01/30/2017	Prepaid balance credit	EXTRA-LARGE REPSCRUBS 596267-RSXL	\$4.99
07:11 pm 01/30/2017	Vending Purchases	LARGE REPSCRUBS 596267-RSLG	\$4.99
06:53 pm 01/30/2017	Vending Purchases	LARGE REPSCRUBS 596267-RSLG	\$4.99
06:49 pm 01/30/2017	Membership fee	DOUBLE EXTRA-LARGE COVERALLS 596267-CA2X	\$3.99
06:32 pm 01/30/2017	Prepaid balance replenishment	LARGE REPSCRUBS 596267-RSLG	\$4.99
06:27 pm 01/30/2017	Vending Purchases	MEDIUM LABCOATS 596267-LCMD	\$2.99
06:18 pm 01/30/2017	Credit Card Transaction credit/refund	EXTRA-LARGE LABCOATS 596267-LCXL	\$2.99
06:10 pm 01/30/2017	Prepaid balance credit	DOUBLE EXTRA-LARGE REPSCRUBS 596267-RS2X	\$4.99
06:01 pm 01/30/2017	Membership fee	SMALL REPSCRUBS 596267-RSSM	\$4.99
05:44 pm 01/30/2017	Membership fee	SMALL REPSCRUBS 596267-RSSM	\$4.99
05:37 pm 01/30/2017	Prepaid balance replenishment	EXTRA-LARGE REPSCRUBS 596267-RSXL	\$4.99
05:33 pm 01/30/2017	Prepaid balance replenishment	LARGE REPSCRUBS 596267-RSLG	\$4.99

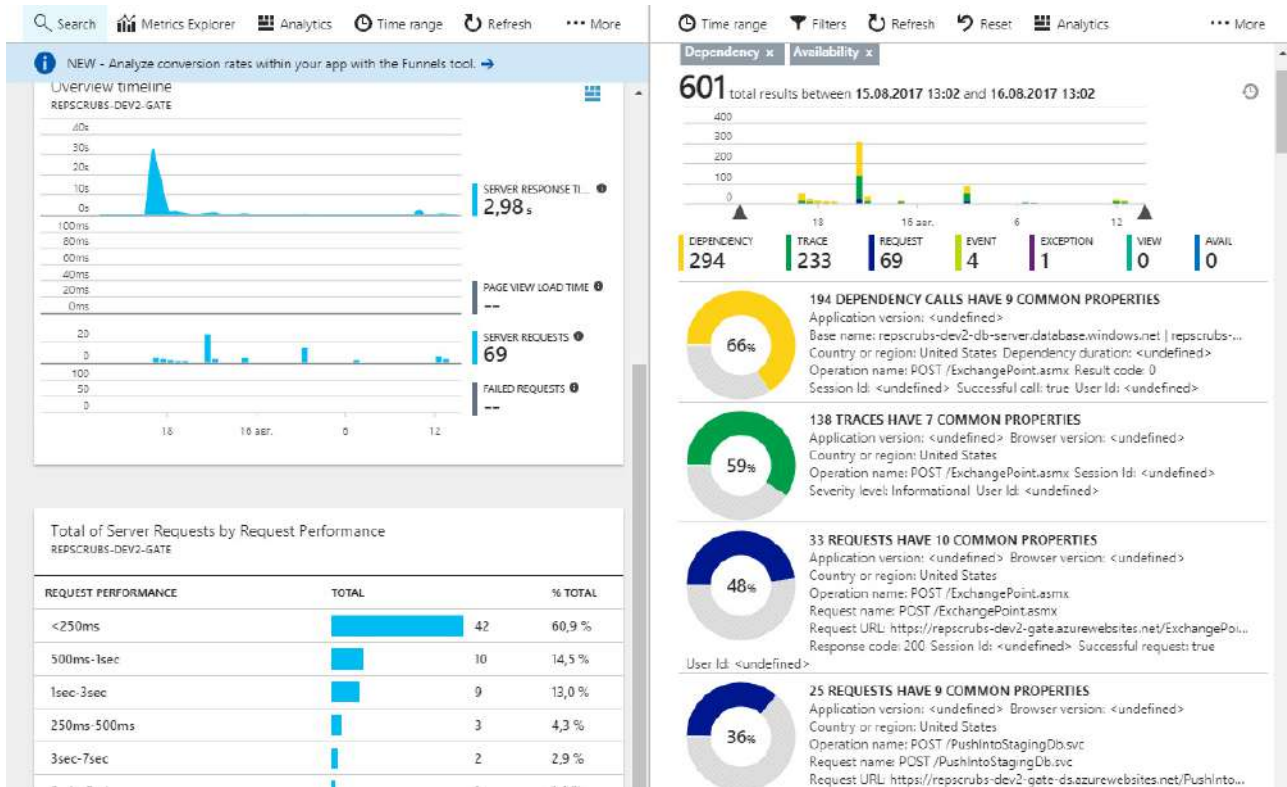
*User account purchase history*

All client actions and transactions, be it wrong PIN code or making a deposit, is logged in the system. If the wrong PIN code was entered multiple times, a warning is sent to the client.





Microsoft Application Insights is a base for logging.



Log analyzer

As a competitive edge, a single use scrub set has a special name badge on the coat that fades out with time, therefore signaling the doctor that the scrub is losing sterility.

To print a personalized name badge for a scrub set at any hospital, the badge printing system gets client data from the intermediary badge which is synchronized with Microsoft Dynamics CRM in real time. This way, the doctor also gets a freshly printed name badge with a new set of scrubs in any hospital they work.

*“The most challenging job was to enable data-driven subscription reports with given parameters. The reports are used by vending machine supplier as well as the hospitals themselves who are interested in their sales commission. The challenge is that Microsoft Dynamics CRM does not have the required report form. But it was made possible using DevExpress reporting”, – says Sergey Gusev, Head of CRM department at WaveAccess.*

DevExpress reporting is used to generate reports and send them to stakeholders automatically. The sending options can be adjusted in the CRM system. The report looks like this:



PDF-report is mailed out to system users on a timely basis.

As a result, the stakeholders are informed about their transactions, and reports are generated on given settings and mailed out as PDF attachments.

## The result

In partnership with the customer, a cloud solution is developed to sell single use scrub sets by vending machines in hospitals.

At a hospital, the healthcare professional is requested to enter their PIN and Client ID to get scrubs. If they have forgotten to refill their scrubs deposit, they may call the support line, name their Client ID and the transaction will be processed, allowing them to get a set of scrubs. All scrub sets include a printed name badge, based on the Client ID.

All stakeholders (business owners, hospitals, and clients) can adjust their report settings. Sales department collects data on each vending machine. Hospitals keep account of their point-of-sale commission that depends on the number of items sold. And the users, who are healthcare professionals, can track their scrub expenses and account balance.





If you need to develop  
a similar project,  
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Read more at

[wave-access.com](http://wave-access.com)