The 46th Worldskills Competition

IT Software Solutions for Business

Test Project for the 1st Phase

第 46 届世界技能大赛

商务软件解决方案项目

首次阶段性考核试题

Session 1

第 1 阶段

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Contents

内容

The session 1 of the test project consists of the following documentation/files:

测试项目的第 1 阶段包含以下文档/文件：

1	TestProject_S1.pdf	(Session 1 instructions)
	TestProject_S1.pdf	(第 1 阶段说明)
2	MSSQL_S1.sql	(SQL Script to create tables with data for Microsoft SQL)
	MSSQL_S1.sql	(SQL 脚本，为 Microsoft SQL 创建包含数据的数据表)
3	Image Folder	(The picture material)
	Image 文件夹	(图片素材文件夹)

Introduction

介绍

With the increase of business demand, **Skyward** company's various production lines are running fast. In order to ensure production efficiency and timely completion of production tasks, it requires regular maintenance and repair of equipment and facilities required for production, and timely replacement of parts and components of equipment and facilities. Therefore, the company has built a number of warehouses for storing common parts.

Skyward 公司随着业务量需求的增大，各个生产线都在快速运转，为了保证生产效率及生产任务按期完成，要求对生产所使用设备设施定期保养、维修，及时更换设备设施的零部件。因此，公司配建了多个仓库用于储备常用零部件。

In this session, you will need to design and develop a warehouse management desktop application for the company to manage the inventory of parts. The role of the system is the warehouse supervisor and warehouse keeper.

在本阶段，你需要为公司设计开发一套仓储管理桌面应用程序，主要用于管理零部件盘点业务。使用角色为仓库主管和仓库管理员。

The program needs to have the following functions:

该程序需要具备以下功能：

- Login;
- 登录；
- Warehouse Detail, Create Inventory Checking Task, View Inventory Checking Report;
- 仓库详情、创建盘点任务、查看盘点报告；
- View Inventory Checking Task, Input Inventory Checking Result.
- 查看盘点任务、输入盘点结果。

Description of Project and Tasks

测试项目和任务描述

You have 2.5 hours for this session.

本阶段时间 2.5 小时。

While developing the test project, please make sure the deliverables conform to the basic guidelines drawn out by different departments at **Skyward** company:

开发测试项目时，请确保可交付成果符合 **Skyward** 公司各部门所制定的基本规则：

- There should be consistency in using the provided style guide throughout development.
- 在整个开发过程中，使用所提供的风格指南时应该保持一致。
- All required software modules must have applicable and useful validation and error messages as expected by the industry.
- 所有要求的软件模块必须有符合行业期待的适用且有用的验证及错误提示信息。
- Where applicable, use comments in code to have the code more programmer-readable.
- 在适当的地方，在代码中使用注释以使代码更加易于编程人员理解。
- Offer a scrollbar if the number of records on a list or a table that do not fit in the interface area comfortably. Hide scrollbars if all content can comfortably be displayed.
- 如果界面大小无法合适地满足列表或数据表中的记录数目，提供一个滚动条。若所有内容可以合适地显示，则隐藏滚动条。
- Please use "yyyy/MM/dd" for all date format in this system.
- 在本系统中所有的日期格式请使用"yyyy/MM/dd"。
- When loading a picture, if the specified picture does not exist or the load fails, uniformly fill it with "no-picture.png".
- 当加载图片时，如果指定的图片不存在或者加载失败，统一使用"no-picture.png"填充。
- When using colors to differentiate between rows or records, there needs to be visible clarification on the screen as to what they stand for.
- 当使用颜色来区分行或记录时，窗口中应有清晰可见的说明来解释颜色所代表的含义。
- The wireframe diagrams provided as part of this document are only suggestions and the solution produced does not have to be, in any way, mirror what has been pictured.
- 本文档提供的线框图仅供参考，所开发的解决方案不必照搬所提供的图样。
- Time management is critical to the success of any project and so it is expected of all deliverables to be complete and operational upon delivery.
- 时间管理对任何项目的成功开发是非常重要的，因此希望所有可交付成果在交付时是完整与可运行的。
- Please save your deliverables in the "Session1" folder on drive D of your computer. When submitting deliverables in the end, there is no need to submit the database, because the assessment of the program will be conducted based on the standard database.
- 请将你的设计开发成果存放在你电脑的 D 盘目录下的"Session1"文件夹中。最后提交成果时，无需提交数据库，程序的评判将基于标准数据库进行。
- In the end, you need to make the folder which stores the deliverables of that session into a compressed file and submit the compressed file "Session1.zip".
- 最后，你需要将存放该阶段成果的文件夹形成压缩文件 "Session1.zip"并提交。

Instructions to the Competitor

向选手的说明

1.1 Create the database and import data

创建数据库和导入数据

Create a database named "**S1**" in your desired RDBMS platform (Microsoft SQL Server).

在你选择的关系型数据库管理系统平台（Microsoft SQL Server）上创建一个名称为"**S1**"的数据库。

Execute the database SQL script file, and import the data into your database.
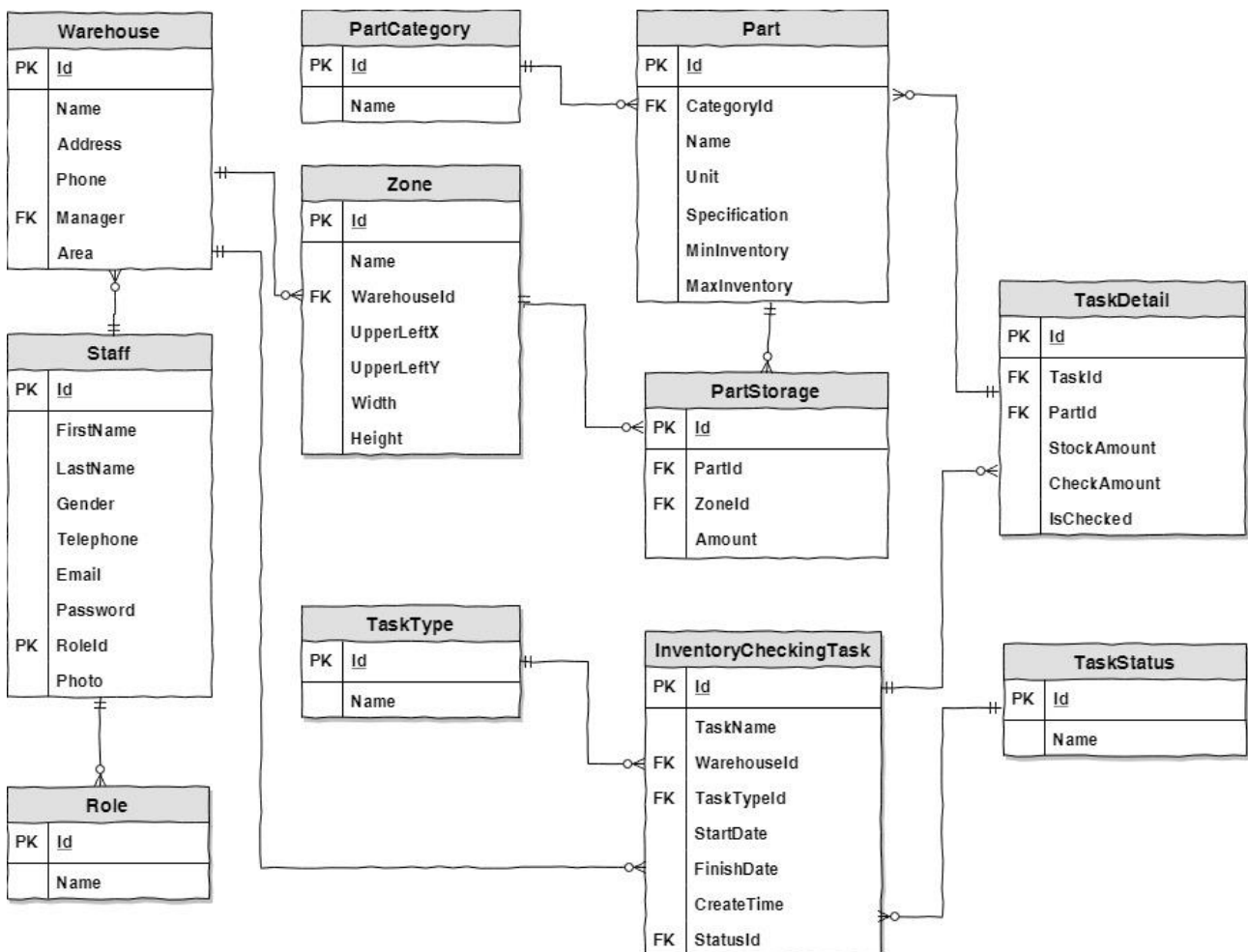
执行数据库脚本文件，导入数据到你的数据库中。

The database structure provided for the purpose of this section cannot be altered. This applies to removal of tables, adding or deleting any fields on the tables or of change in their data types.

不能修改本阶段的数据库结构，包括不能删除数据表，不能添加或删除数据表中的任何字段，不能修改数据类型。

This will be the database you develop and use in this session.

这将是你在本阶段开发使用的数据库。

To help further perceive the thinking behind the structure of the database, the database designers provide an Entity Relationship Diagram (ERD). The aforementioned diagram explains the conceptual and representational model of data used in the database.

为了进一步帮助了解数据库结构背后的思想，数据库设计者提供了一个实体关系图（ERD）。该图解释了数据库中所使用的数据的概念和表示模型。

1.2 Create the application
创建应用程序

Create an application named with "**DesktopS1**". At this session, you need to develop the application in accordance with subsequent requirements.

创建一个应用程序，命名为"**DesktopS1**"。本阶段，你需要按照后续要求开发该应用程序。
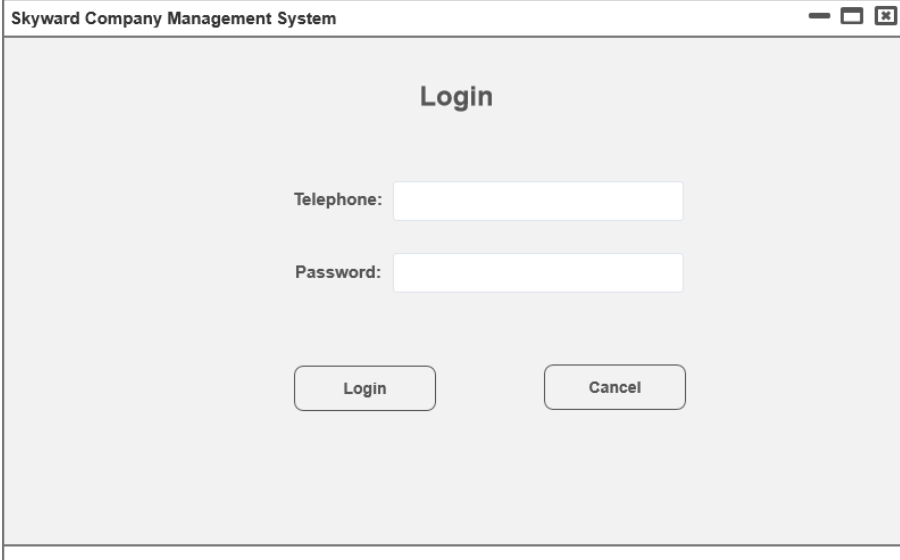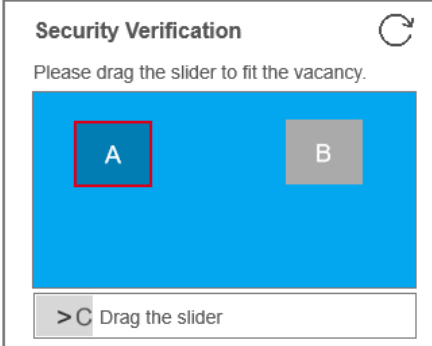
1.3 Login
登录

Fig.1 Login

Fig.2 Verification

The warehouse supervisor and warehouse keeper log in to the system using the mobile phone number and password. After the warehouse supervisor logs in successfully, the "Warehouse Detail" interface is opened. After the warehouse keeper logs in successfully, the "View Inventory Checking Task" page is displayed.

仓库主管和仓库管理员使用手机号和密码登录系统，仓库主管登录成功后，打开"Warehouse Detail"界面；仓库管理员登录成功后，打开"View Inventory Checking Task"界面。

If the login fails for three times and the login button becomes unavailable, the user should be asked to drag the pattern for verification. Only after the verification is successful can the login button be restored to the available state.

登录失败应给予用户合适的提示信息，若登录失败次数达到 3 次，登录按钮变为不可用状态，此时需要用户进行滑动拼图验证，验证通过后，登录按钮才能恢复为可用状态。

Pattern drag stitching verification requirements are as follows:

滑动拼图验证要求如下：

- Image block A and region B appear, and image block A is to the left of region B;
- 在验证区显示 A 图块和 B 区域，A 图块位于 B 区域左侧；
- When dragging the slider, the map block A moves to the direction of region B;
- 拖动 C 滑块时，A 图块向 B 区域方向移动；
- When figure A overlaps with area B, the verification succeeds; Otherwise, the block of A reverts to its initial position and waits for re-verification;
- 当 A 图块与 B 区域重合时，验证通过；否则，A 图块回归到初始位置，等待重新验证；
- After clicking the refresh icon, rearrange map block A and region B, that is, map block A and region B appear randomly.
- 点击刷新图标后，重新布置 A 图块和 B 区域，A 图块和 B 区域是随机出现的。

1.4 Warehouse Detail
仓库详情

Skyward Company Management System
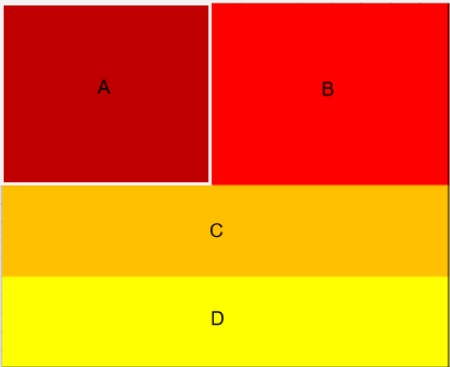
Warehouse Detail

Warehouse: Spring Warehouse

Warehouse Information

Name: Spring Warehouse
Area: 3000 m^2
Warehouse Keeper: Berk Owers

Phone: 202-439-6609
Address: Alazzo Venier dei Leoni 701 Dorsoduro 30123
Last Checking Date: 2021/11/01

Warehouse Layout

A B C D

Parts in Warehouse

2 Parts, total 85 in Zone A

PartName	Category	Specification	Amount	MinInventory
Jaw Crusher Adjusting Device	Special Machinery	85	35	30
High Chromium Alloy Blades	Special Machinery	600/800	50	30
......	......		......	
......	......		......	
......	......		......	

Create Inventory Checking Task

Fig.3 Warehouse Detail

After the warehouse supervisor logs in successfully, the "Warehouse Detail" page is displayed.

仓库主管登录成功后，打开"仓库详情"界面。

On this interface, the warehouse supervisor can view the information about all the warehouses of the company, including the warehouse partitions and parts stored in each zone.

在该界面，仓库主管可以查看公司各个仓库情况：包括仓库分区、各分区存储的零部件等相关信息。

List all warehouses in the combo box. After the user selects a warehouse, the basic information of the warehouse and storage information of parts are displayed.

在组合框中列出所有仓库，选择一个仓库后，显示仓库基本信息和零部件存储信息。

The basic information of the warehouse includes:

仓库基本信息包括：

- Warehouse Name：仓库名称；
- Phone：仓库电话；
- Area：仓库面积；
- Address：地址；
- Warehouse Keeper：仓库管理员姓名；
- Last Checking Date：上次盘点完成日期。

The storage information of warehouse parts must meet the following requirements:

仓库零部件存储信息，要求如下：

- Display the location information of the warehouse on the left side, display each location according to the coordinate position in the database, each location should be distinguished by different colors, and identify the name of each location;

- 在左侧显示仓库分区信息，根据数据库中的坐标位置等数据显示各分区，各分区应通过不同颜色区分，并且标识分区名称；

- When a storage location is selected, the selected storage location should be highlighted and the component information of the storage location should be displayed on the right side of the interface. Parts are displayed in ascending order according to the part name. The part information includes:

- 当选中某分区时，选中分区突出显示，并在界面右侧显示该分区存储的零部件信息，按照零部件名称升序显示。信息包括：
  - Part Name：零部件名称；
  - Category：类别；
  - Specification：规格型号；
  - Amount：库存数量；
  - Min Inventory：库存下限。

Click "Create Inventory Checking Task" button to switch to the "Create Inventory Checking Task" page and create an inventory checking task.

单击"Create Inventory Checking Task"按钮，切换到"Create Inventory Checking Task"界面，创建库存盘点任务。

1.5 Create Inventory Checking Task
创建盘点任务

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Create Inventory Checking Task

Warehouse: Spring Warehouse ⌄

Task Name: Whole Warehouse Checking Task in 2021.12

Task Type: Whole Warehouse ⌄   **Start Date:** 2021/12/31 📅

Parts to be checked (80):

Seq.	Zone	PartId	PartName	Unit	Specification	StockAmount
1	A	38	High Chromium Alloy Blades	Part	600/800	35
2	A	1	Jaw Crusher Adjusting Device	Part	85	35
3	B	122	Beryllium Copper	Piece	18	40
4	B	100	Custom Accessories For Rock Drill	Part	Customization	42
.	......	......	......	......	......	......

Submit

Fig.4 Create Inventory Checking Task

The warehouse supervisor can create an inventory checking task according to the requirements of the company. The inventory checking task information to be recorded includes:

仓库主管可以根据公司要求创建盘点任务，需要记录以下信息：

- Warehouse：仓库；
- Task Name：任务名称；
- Task Type：任务类型，包括下面 2 种类型；
  - Whole Warehouse：整库盘点，选择该类型后，盘点所有分区的零部件；
  - Portion Warehouse：分区盘点，选择该类型后，动态显示该仓库的所有分区，可以选择一个或多个分区去盘点，请自行设计界面，完成选择分区功能。
- Start Date：开始日期。

Parts to be checked in the warehouse are displayed below. Parts are displayed in ascending order according to the storage zone name. If the zone name is the same, parts are displayed in ascending order according to the part name. including:

在下方显示要盘点的零部件信息，按照分区名称升序显示，当分区名称相同时，按照零部件名称升序显示。包括：

- Seq.：序号；
- Zone：分区；
- PartId：零部件编号；
- PartName：零部件名称；

- Unit：单位；
- Specification：规格型号；
- StockAmount：库存数量。

Click the "Submit" button to submit an inventory checking task.

单击"Submit"按钮完成盘点任务的创建。

1.6 View Inventory Checking Task
查看库存盘点任务

Skyward Company Management System

View Inventory Checking Task

Warehouse: All   Task Type: All   Status: All   Search

Inventory Checking Task

Seq.	WarehouseName	InventoryCheckingTask Name	TaskType	CreateTime	StartDate	FinishDate	Status
1	Spring Warehouse	Inventory Checking Task of Spring Warehouse, 2021-09	Whole Warehouse	2021/08/31 08:00:00	2021/09/01	2021/09/10	Finished
2	......	......	......	......	......	......	......

Start   Input Inventory Result   View Inventory Checking Report

Fig.5 View Inventory Checking Task

Warehouse keeper can view his/her inventory checking tasks in this interface. Displays in descending order by start date.

仓库管理员可以在该界面中查看他所管理仓库的盘点任务，按照开始日期降序显示。

Load the list of warehouses managed by the logged-in warehouse keeper in the "Warehouse" combo box and provide the All option to view the inventory tasks of All warehouses managed.

在"Warehouse"组合框中加载该仓库管理员管理的仓库列表，并提供 All 选项，能够查看其管理的所有仓库的盘点任务。

Inventory task type displays all types supported in the system and provides the All option.

盘点任务类型显示系统中支持的所有类型，并提供 All 选项。

Inventory checking task status can be divided into the following types:

盘点任务状态可分为以下几种：

- All：所有状态；
- NoStart：未开始；
- Ongoing：进行中；
- Finished：已完成。

Ability to query inventory checking task by warehouse, inventory checking task type and status. The following information is displayed:

能够根据仓库、盘点任务类型和状态查询盘点任务。盘点任务信息包括：

- Seq.：序号；
- Warehouse Name：仓库名称；
- Inventory Checking Task Name：任务名称；
- Task Type：任务类型；
- Create Time：创建时间；
- Start Date：开始日期；
- Finish Date：完成日期；
- Status：状态。

Select an no start inventory checking task, and click the "Start" button to start the task, and the status changes to "Ongoing".

选择一个未开始的盘点任务，单击"Start" 按钮，开始盘点任务，状态变为"Ongoing"。

Select an ongoing inventory checking task and click the "Input Inventory Result" button to open the "Input Inventory Result" interface to record inventory results.

选择一个进行中的盘点任务，单击"Input Inventory Result" 按钮可以打开"Input Inventory Result"界面录入盘点结果。

Select a finished inventory checking task and click the "View Inventory Checking Report" button to open the "Inventory Checking Report " interface to view report.

选择一个已完成的盘点任务，单击"View Inventory Checking Report" 按钮可以打开"Inventory Checking Report"界面查看盘点报告。

1.7 Input Inventory Checking Result
输入盘点结果

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Input Inventory Checking Result

Auto Save ○ Every 10 minutes ● Every 5 minutes ○ Every 1 minute

Warehouse Name: Speed Warehouse

TaskName: Inventory Checking Task of Speed Warehouse

Task Type: Whole Warehouse

| Download Import Template | Import Result |

Progress:

| 100 | 70 |

☐ Only show no checked parts

Seq.	Zone	Category	PartName	Unit	Specification	StockAmount	CheckAmount
1	A	Hydraulic	Jaw Crusher Adjusting Device	Part	85	100	100
2	A	Hydraulic	High Chromium Alloy Blades	Part	600/800	100	100
3	B	Electrical	Custom Accessories For Rock Drill	Part	Customization	80	
...	...	...	...	...	...	...	

| Save | Submit |

Fig.6 Input Inventory Checking Result

The warehouse keeper can record inventory checking results on this interface.

仓库管理员可以在该界面记录盘点结果。

Show inventory warehouse name, task type, task name.

显示盘点仓库名称，任务类型，任务名称。

The graph is used to display the inventory progress information, as shown in the figure. Green represents the inventory quantity, while red represents the inventory quantity. The proportion of green and red should meet the comparison relationship between the quantity. And the sum of the green and red quantities should be equal to the sum of the parts counted.

使用图形显示盘点进度，如图所示，绿色表示已盘点数量，红色表示未盘点数量，绿色与红色所占比例应满足数量之间对比关系。并且绿色和红色数量之和应等于被盘点的零部件数量之和。

Part information in the warehouse is displayed below. Parts are displayed in ascending order according to the storage zone name. If the zone name is the same, parts are displayed in ascending order according to the part name. including:

显示要盘点零部件的明细信息。零部件按照分区名称升序显示，当分区名称相同时，按照零部件名称升序显示。包括：

- Seq.：序号；
- Zone：分区；
- Category：零部件类别；
- Partname：零部件名称；

- Specification：规格型号；
- Stock Amount：库存数量；
- Check Amount：盘点数量，用户可以直接输入盘点数量。

The check amount entered by the warehouse keeper will be automatically saved to the database at a certain interval. You can configure the automatic saving interval as follows:

输入的盘点数量每间隔一定时间会自动保存到数据库，并可以配置自动保存的时间间隔，时间间隔有以下几种：

- Every 10 minutes：每间隔 10 分钟保存 1 次，默认为每间隔 10 分钟保存 1 次；
- Every 5 minutes：每间隔 5 分钟保存 1 次；
- Every 1 minute：每间隔 1 分钟保存 1 次。

If the "Only show no checked parts" check box is selected, only the unchecked parts are displayed.

当"Only show no checked parts"复选框处于选中状态时，仅显示未盘点的零部件。

Click "Download Import Template" button to download the inventory result import template to the local PC. The template file is in Excel format and contains all the inventory parts information in the data grid, with the inventory quantity listed as empty. Please design the template file by yourself.

单击"Download Import Template"按钮，能够将盘点模板文件下载到本地。模板文件是 Excel 格式，其中包含数据网格中的所有盘点零部件信息，盘点数量列为空。请自行设计该模板文件。

Click the "Import Result" button to import the completed import template into the database. The following requirements shall be met:

单击"Import Result"按钮，能够将填写好的盘点模板文件导入到界面数据网格中。应满足如下要求：

- When the number of parts counted is not a value, skip the parts;
- 当填写的零部件盘点数量不是数值时，跳过该零部件；
- Finally, the total number of parts records that should be imported and the number of records that can be imported successfully are suggested;
- 最后提示应导入的零部件总记录条数和成功导入到界面数据网格中的记录条数；
- You can view details on failed data import;
- 用户能够查看未导入成功的数据明细；
- The imported data overwrites the previous data.
- 后导入的数据会覆盖之前的数据。

Click the "Save" button to save the input inventory data immediately.

单击"Save"按钮，能够即时保存盘点数据。

When the inventory task is complete, click the "Submit" button to set the inventory task to "Finished" status and switch to the "Inventory Checking Report" page to view the inventory report of the inventory task.

当盘点全部完成后，单击"Submit"按钮，将盘点任务设置为"Finished"状态，并切换到"Inventory Checking Report"页面查看该盘点任务的盘点报告。

1.8 Inventory Checking Report

盘点报告

Fig.7 Inventory Checking Report

The warehouse supervisor and warehouse keeper can view the inventory report on this interface, which displays the inventory checking task information, abnormal parts information and parts that need replenishment.

仓库主管和仓库管理员可以通过该界面查看盘点报告，显示对应的盘点任务信息，盘点异常零部件信息，需要补货零部件信息。

Display inventory checking task information, including:

显示盘点任务信息，包括：

- Warehouse：仓库；
- Inventory Checking Task：盘点任务名称；
- Task Type：任务类型；
- Create Time：创建时间；
- Start Date：开始日期；
- Finish Date：完成日期；
- Status：状态。

Display abnormal parts checked and list the parts whose inventory quantity is inconsistent with the inventory quantity, including:

显示盘点异常零部件信息，列出库存数量与盘点数量不一致的零部件，包括：

- PartName：零部件名称；
- Specification：规格型号；
- Stock Amount：库存数量；
- Check Amount：盘点数量。

Display the information of parts to be replenished, list the parts whose inventory quantity is less than the lower limit of inventory, including:

显示需要补货的零部件信息，列出盘点数量小于库存下限的零部件，包括：

- PartName：零部件名称；
- Specification：规格型号；
- Check Amount：盘点数量；
- Min Inventory：库存下限。

Click "Print" button to save the page as a PDF file to a local disk. The data information in the exported PDF file can be copied.

单击"Print"按钮，能将盘点报告以 PDF 格式保存到本地磁盘，并且文件中的各项信息都能够复制。