# 软件需求规格说明(IEEE 830 标准)

(System Requirement Specification Document)

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## **1. 引言**

### 1目的

This document describes the final system requirements of the software implements a self-service billing central temperature AC control system “ACC SOFTWARE”.

### 2文档约定

This document is written in free form, easy to understand by both customer and team members.

“ACC SOFTWARE” is the temporary name of the software that can be changed in every moment, stands for “air conditioning control software”. Any team member can change any part after discussing it with the others.

The parts that need special attention of the team members are marked with yellow color. Please remove these parts in the final version.

Required help with the translating this document to Chinese!

AC – Air Condition

SRS – System Requirement Specification

GUI – Graphic User Interfaces

### 3预期的读者和阅读建议

This system requirement specification document is written to be read by developer team and the customer. This document contains 6 big parts, every each part 3 or more sub parts. The reader can see the detailed structure of the project in the "content" section.

### 4产品的范围

About 50% of the residential and commercial energy consumption in most developed countries is used by air conditioning systems. Therefore, increasing the efficiency of Air Conditioning systems, therefore, can greatly reduce the overall energy footprint of a commercial building.

This software is designed to provide users the remote control over the hotel air conditioning (AC) system and accurately calculate the costs spent on AC system in one room or the whole hotel.

For the hotel guest, “ACC SOFTWARE” gives the user the opportunity to take control over their own expenses. It is also a very convenient feature for a wide range of hotel guests who support the idea of environmental friendliness, which will help a potential guest to choose exactly the hotel in which this software is installed. On the part of the hotel manager, this software will help to better control energy use. In the future, this software can help you choose the most suitable air conditioning system.

The reader can read more about AC control systems in general on the following webpage:

https://www.researchgate.net/publication/326175412\_Development\_of\_a\_Wearable\_Air\_Conditioner\_Control\_System

The reader can read more about AC system expenses on the following webpage:

https://www.fixr.com/costs/air-conditioner-installation

### 5参考文献

This document is created based on IEEE 830 standard. IEEE 830 describes the content and qualities of a good software requirements specification (SRS). IEEE 830 recommended practice is aimed at specifying requirements of software to be developed but also can be applied to assist in the selection of in-house and commercial software products. Nowadays it’s broadly used for SRS documentation in software development companies. The reader can read more about IEEE 830 on the following webpage: <https://www.semanticscholar.org/paper/IEEE-Recommended-Practice-for-Software-Requirements-Tripp-Byrne/aeda995a548ad411a0455a233114a0237c7ad4aa>

While writing the content of System Requirement Specification, the team also considered 软件工程模型与方法（第二版）written by 肖丁and修佳鹏.

The methodology and idea of using IEEE 830 standard was taken from Dr. Rajib Mall’s Open Course of Software Engineering supported by NPTEL Online Specification courses:

https://www.youtube.com/playlist?list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt

## **2. 综合描述**

这一部分概述了正在定义的产品以及它所运行的环境、使用产品的用户和已制知的限制、假设和依赖。

This section provides an overview of the product being defined and the environment in which it operates, the users who use the product, and the limitations, assumptions, and dependencies that have been made.

### 1产品的前景

This SRS document describes the requirements to the final complete version of AC control system software, a new, self-contained product that won’t need further improvements.

### 2产品的功能

The main functions of this product are:

* Control
* Output the AC current status
* Output AC related statistics

### 3用户类和特征

We can divide the major user group to two equally important user classes: hotel personnel and hotel guests.

In the final version of this software, **hotel guests** have the following rights:

* Control
  + Enable/disable AC
  + Control the AC wind temperature
  + Control the AC wind speed
* Monitor current status
  + Monitor current AC expenses
  + Monitor current AC temperature
  + Monitor current AC wind speed

In the final version of this software, **hotel manager** have the following rights:

* Control
  + Enable/disable AC
  + Control the AC default wind temperature
  + Control every room’s expenses
* Monitor status
  + Monitor current AC expenses
  + Monitor current AC temperature
  + Monitor current AC wind speed
  + Monitor current session’s AC enable time
* Statistic options
  + Set billing rates for air conditioning in each room
  + Generate bills for each room
  + Generate daily report, weekly report and monthly report for each room
  + Generate air conditioner usage tables for all rooms in the hotel

### 4运行环境

The hardware compatible with this software is negotiable. However, it expects the AC system to measure the temperature in the room and turn off in the case when wind temperature is the same as room temperature. This software is developed for Windows operation system (not including Windows Mobile) and it can’t be ported to any another operating system. This software is mainly focused on PC.

### 5设计和实现上的限制

In current case the main limitation for the software team is the development time and using the new technologies that have not been implemented before. The developer team will have to spend majority of time researching the topic.

### 6假设和依赖

This software expects the AC system hardware to measure the temperature in the room and turn off in the case when wind temperature is the same as room temperature. For the statistics report Monitor, the computer should be able to open \*.xls and \*.txt files.

## **3. 外部接口需求**

利用本节来确定可以保证新产品与外部组件正确连接的需求。关联图表示了高层抽象的外部接口。需要把对接口数据和控制组件的详细描述写入数据字典中。如果产品的不同部分有不同的外部接口，那么应把这些外部接口的详细需求并入到这一部分的实例中。

This section is used to determine the requirements that can ensure the correct connection of new products to external components. The association diagram represents the high-level abstract external interface. A detailed description of the interface data and control components needs to be written into the data dictionary. If different parts of the product have different external interfaces, then the detailed requirements of these external interfaces should be incorporated into the examples in this part.

### 3. 1用户界面

陈述所需要的用户界面的软件组件。描述每个用户界面的逻辑特征。以下是可能要包括的一些特征：

.将要采用的图形用户界面（GUI）标准或产品系列的风格。

.屏幕布局或解决方案的限制。

.将出现在每个屏幕的标准按钮、功能或导航链接（例如一个帮助按钮）。

.快捷键。

.错误信息显示标准。

对于用户界面的细节，例如特定对话的布局，应该写入一个独立的用户界面规格说明中，而不能写入软件需求规格说明中。

“ACC SOFTWARE” will use following user interface (UI) features:

* Standard graphic user interface (GUI). Every screen should contain “Minimize the window” and “exit” buttons (except error messages)
* Each screen (except login screen) should have the following features:
  + “Submit” button – submits changes
  + “Default” button – sets all the values to default. Impacts the temperature and the speed.
* Error message should contain “OK” and upper right corner “Exit (X)” buttons, with the error code in the center.
* Keyboard is not used for this software except for the standard Windows system hotkeys (for example, “Alt + Tab”)
* The statistic message should contain “OK” and upper right corner “Exit (X)” buttons, with the statistic values in the center.
* The main menu for the **manager** client should contain:
  + Room choosing option
  + Room stats
  + “Settings” button
  + “Check” button
  + “Weekly report” button
  + “Daily report” button
  + “Monthly report” button
  + “Overall report” button
* The main menu for guest client should contain:
  + Room stats
  + Room choosing option???? Should the user set it or it will be set automatically? If automatically, how it’s going to be be implemented?
  + Options to set the temperature
  + Options to set the wind speed
* The settings GUI (for manager) should contain:
  + Options to control default settings of the AC
  + Options to control expenses of the chosen room
  + Options to control billing rates for air conditioning in each room

### 3. 2硬件接口

This software is mainly focused on PC. This software expects the AC system hardware to measure the temperature in the room and turn off in the case when wind temperature is the same as room temperature.

### 3. 3软件接口

“ACC SOFTWARE” will have to work with software that might properly Monitor \*.xls files, such as Microsoft Excel, to work with database and Monitor the overall statistics.

### 3. 4通信接口

描述与产品所使用的通信功能相关的，包括电子、Web浏览器、网络通信标准或协议及电子表格等等。定义了相关的消息格式。规定通信安全或加密问题、数据传输速率和同步通信机制。

## **4. 系统特性**

### 4. 1说明和优先级

In order to reduce the problems related to process management, the following listing groups the sub-requirements by priority

In the final version of this software, **hotel guests** have the following rights (sorted by priority):

* First level of priority
  + Enable/disable AC
* Second level of priority
  + Control the AC wind temperature
  + Control the AC wind speed
  + Monitor current AC temperature
  + Monitor current AC wind speed
* Third level of priority
  + Monitor current AC expenses

In the final version of this software, **hotel personnel** have the following rights (sorted by priority):

* First level of priority
  + Enable/disable AC
  + Monitor current session’s AC enable time
* Second level of priority
  + Monitor current AC temperature
  + Monitor current AC wind speed
  + Monitor current session’s AC enable time
  + Control the AC default wind temperature
* Third level of priority
  + Monitor current AC expenses
  + Control current room’s expenses
* Fourth level of priority
  + Set billing rates for air conditioning in each room
* Fifth level of priority
  + Generate bills for each room
  + Generate daily report, weekly report and monthly report for each room
  + Generate air conditioner usage tables for all rooms in the hotel

### 4. 2功能需求

|  |  |  |
| --- | --- | --- |
|  | 管理端 |  |
| 功能 | 激励 | 响应 |
| 能监控各房间空调的使用情况 | 房间号 | 否在使用  运行时间  温度  风速  当时空调费用 |
| 能控制空调的默认温度 | 设置界面上空调的默认温度进行改变，然后按“submit” | 每个房间默认温度改变了 |
| 能控制空调的开关 | 设置界面上按开关按键，然后按“submit” | 该房间空调的开关状态改变了 |
| 能控制空调的计费 | 设置界面上空调的计费进行改变，然后按“submit” | 全酒店空调的计费改变了 |
| 能设置各房间空调计费费率 | 设置界面上空调计费费率进行改变，然后按“submit” | 该空调的计费改变了 |
| 能生成各房间计费单 | 主界面上按“check” | 生成各房间计费单 txt 文件 |
| 能生成各房间日报表 | 主界面上按“daily report” | 生成各房间日报表 |
| 能生成各房间周报表 | 主界面上按“weekly report” | 生成各房间周报表 |
| 能生成各房间月报表 | 主界面上按“monthly report” | 生成各房间月报表 |
| 能生成酒店全部房间空调使用情况表 | 主界面上按“hotel report” | 打开了xls文件，里面有所需要的统计 |

|  |  |  |
| --- | --- | --- |
|  | 客户端 |  |
| 功能 | 激励 | 响应 |
| 能监控各房间空调的使用情况 | 打开软件 | 温度  风速  当时空调费用 |
| 能控制该房间空调温度 | 主界面上空调的温度进行改变，然后按“submit” | 该房间温度值改变了 |
| 能控制空调的开关 | 主界面上按开关按键，然后按“submit” | 该房间空调的开关状态改变了 |
| 能控制该房间空调风速 | 主界面上空调的风速进行改变，然后按“submit” | 空调的风速值改变了 |

## 5. 其它非功能需求

The following part needs to be written by other team members. A very short introduction will be enough. Please think and write the requirements that can be tested! For example, instead of “fast” you can write “responds to user within 1 second in 90% of cases”

这部分列举出了所有非功能需求，而不是外部接口需求和限制。

### 5. 1性能需求

阐述了不同的应用领域对产品性能的需求，并解释它们的原理以帮助开发人员作出合理的设计选择。确定相互合作的用户数或者所支持的操作、响应时间以及与实时系统的时间关系。你还可以在这里定义容量需求，例如存储器和磁盘窨的需求或者存储在数据库中表的最大行数。尽可能详细地确定性能需求。可能需要针对每个功能需求或特性分别陈述其性能需求，而不是把它们都集中在一起陈述。例如，“在运行微软Windows 2000的450MhzPentium II的计算机上，当系统至少有50％的空闲资源时，95％的目录数据库查询必须在两秒内完成”

### 5.2安全设施需求

详尽陈述与产品使用过程中可能发生的损失、破坏或危害相关的需求。定义必须采取的安全保护或动作，还有那些预防的潜在的危险动作。明确产品必须遵从的安全标准、策略或规则。一个安全设施需求的范例如下：“如果油箱的压力超过了规定的最大压力的95％，那么必须在1秒种内终止操作”。

### 5.3安全性需求

详尽陈述与系统安全性、完整性或与私人问题相关的需求，这些问题将会影响到产品的使用和产品所创建或使用的数据的保护。定义用户身份确认或授权需求。明确产品必须满足的安全性或保密性策略。你可能更喜欢通过称为完整性的质量属性来阐述这些需求，完整性将在第11章介绍。一个软件系统的安全需求的范例如下：“每个用户在第一次登录后，必须更改翁的最初登录密码。最初的登录密码不能重用。”

### 5.4软件质量标准属性

详尽陈述与客户或开发人员至关重要的其产品质量特性。这些特性必须是确定、定量的并在可能时是可验证的。至少应指明不同属性的相对侧重点，例如易用程度优于易学程度，或者可移植优于有效性。

### 5.5业务规则

列举出有关产品的所有操作规则，例如什么人在特定环境下可以进行何种操作。这些本身不是功能需求，但它们可以暗示某些功能需求执行这些规则。一个业务规则的范例如下：“只有持有管理员密码的用户才能执行0.00或更大额的退款操作。“

### 5.6用户文档

列举出将与软件一同发行的用户文档部分，例如，用户手册、在线帮助和教程。明确所有已知的用户文档的交付格式和标准。

## **6. 其它需求**

定义在软件需求规格说明的其它部分未出现的需求，例如国际化需求或法律上的需求。你还可以增加有关操作、管理和维护部分来完善产品安装、配置、启动和关闭、修复和容错，以及登录和监控操作等方面的需求。在模板中加入与你的项目相关的新部分。如果你不需要增加其它需求，就省略这一部分。