COURSE_NAME = OPEN-SOURCE TECHNOLOGY

COURSE_CODE = INT 301

STUDENT NAME = ADARSH MINZ

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FACULTY = SIR. NITISH KUMAR (SCHOOL OF COMPUTER SCIENCE AND ENGINEERING)

DATE OF SUBMISSION = 12TH of July. 2025

CA-1 ASSIGNMENT (ANSWERS)

Question 1: Employee Attendance Time Categorizer (5 Marks)

Write a shell script that asks the user to enter their **check-in time** (in 24-hour format, e.g., 08, 09, 11) and then:

- Categorizes the time as:
    1. **Early** (before 09),
    2. **On time** (between 09 and 10),
    3. **Late** (after 10).
- Displays a message accordingly.

Add proper user prompts and **comments explaining each line** of the script.

ANSWER:

```
#!/bin/bash

checkintime=”09:00”……. #default timestamp set for check in

endtime=”10:00”…….. #default timestamp set for late check in

echo “Enter your current Check in time :” … # Prompting user to enter check in time

read in_time …..# user input variable to store check in time entered by the user


…..# here regular expression {^([01]?[0-9]|2[0-3]):[0-5][0-9]$} has been used to validate the Timestamps in 24 Hr format

….. #{^} used to take starting point of the regular expression as a string and {$} ends as followed

…… # {~} used to define the extend of the regular expression with the operator for the variable

if [[ “$in_time” =~ ^([01]?[0-9]|2[0-3]):[0-5][0-9]$ ]]; then

echo “Format is valid : ”

else ….# else statement if the timestamps is in invalid format

echo “Format is invalid, Please use the format (HH:MM) and the Try again…!! :”

fi

…# if elif else conditions applied to check the user’s check in time

if [[ “$in_time”<=”$checkintime” ]]; then
```

echo “Early check in : $in_time”

elif [[“$in_time”>=”$checkintime”&&”$in_time”<=”$endtime”]]; then

echo “Check on time : $in_time”

elif [[“$in_time”>”$endtime”]]; then

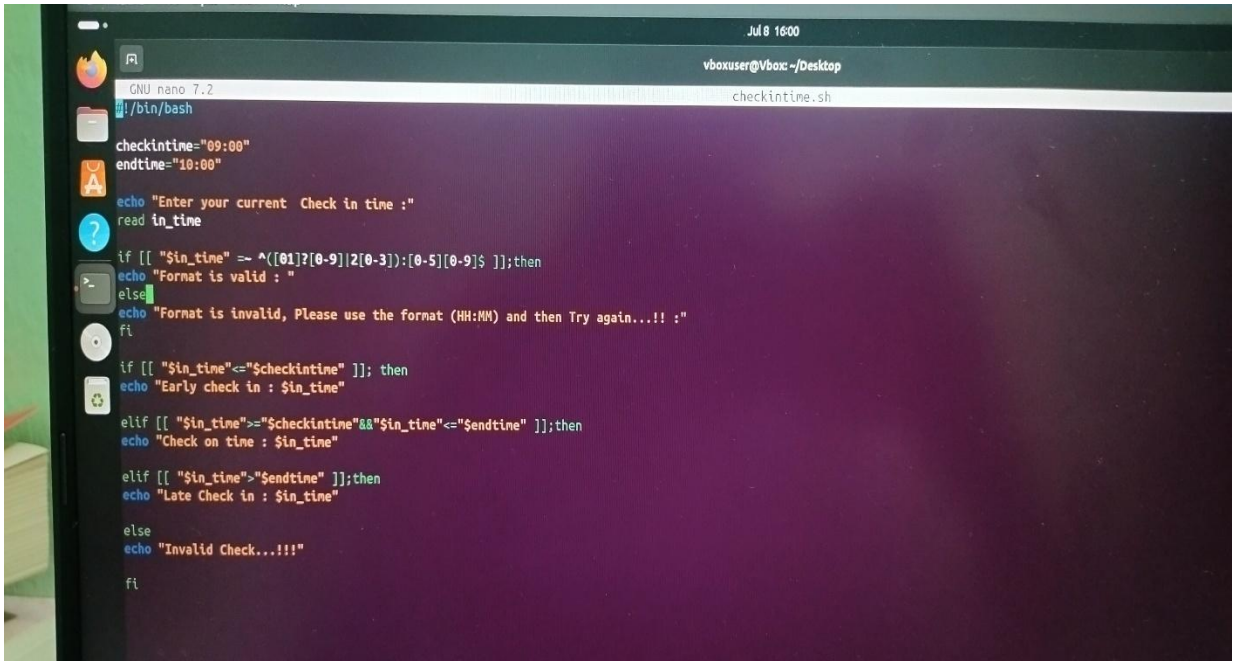
echo “Late check in : $in_time”

else

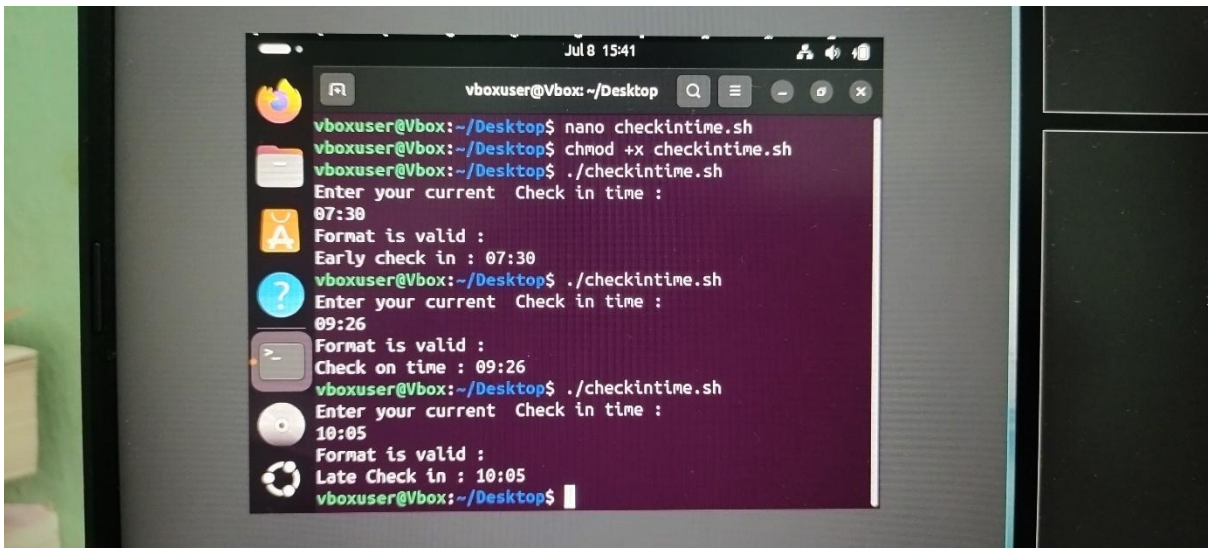
echo “Invalid Check….!!!”

fi

a) Bash script in Vim editor



b) Output of the script given above as : early chek in , check on time and late check in



Question 2: Internet Data Usage Alert System (5 Marks)

Write a shell script that asks the user to enter the **amount of data used (in GB)** in a day. Based on the input, the script should:

1. Display **"Low usage"** if less than 1 GB,
2. Display **"Moderate usage"** if between 1 and 3 GB,
3. Display **"High usage – consider reducing consumption"** if more than 3 GB.

Use conditional statements and include **comments** to explain logic.

ANSWER:

```
#!/bin/bash

…….#prompts the user to get the input

echo “Please enter the amount of data used (in GB only) :”

read data_usage……. # input data variable


….# check the input as an integer type as per the format

…..#{^} used to take starting point of the regular expression as a string and {$} ends as followed

……# {~} used to define the extend of the regular expression with the operator for the variable

if [[ “$data_usage” =~ ^[0-9]+([.][0-9]+)?$ ]]; then

echo “Format is valid : ”

else

echo “Invalid format. Please use the format (e.g 1.04) and the Try again……!!!”

fi

…….# conversion from integer to float datatype for ease in calculation

data_usage_f=$(printf “%.2f” “$data_usage”)

…..# defining Ranges for the usage (.in GB)

low_range=1

med_range=3

high_range=5
```

…..# determining category specs for data usage using if elif else conditionsal statement

if (($(echo “$data_usage_f <= $low_range” | bc -l)));then

category=”LOW USAGE”

elif (($(echo “$data_usage_f >= $low_range && $data_usage_f <= $med_range” | bc -l)));then

category=”MODERATE USAGE”

elif (($(echo “$data_usage_f <= $med_range && $data_usage_f <= $high_range ” | bc -l)));then

category=”HIGH USAGE”

else

category=”HIGH DATA USAGE---- CONSIDER REDUCING CONSUMPTION”

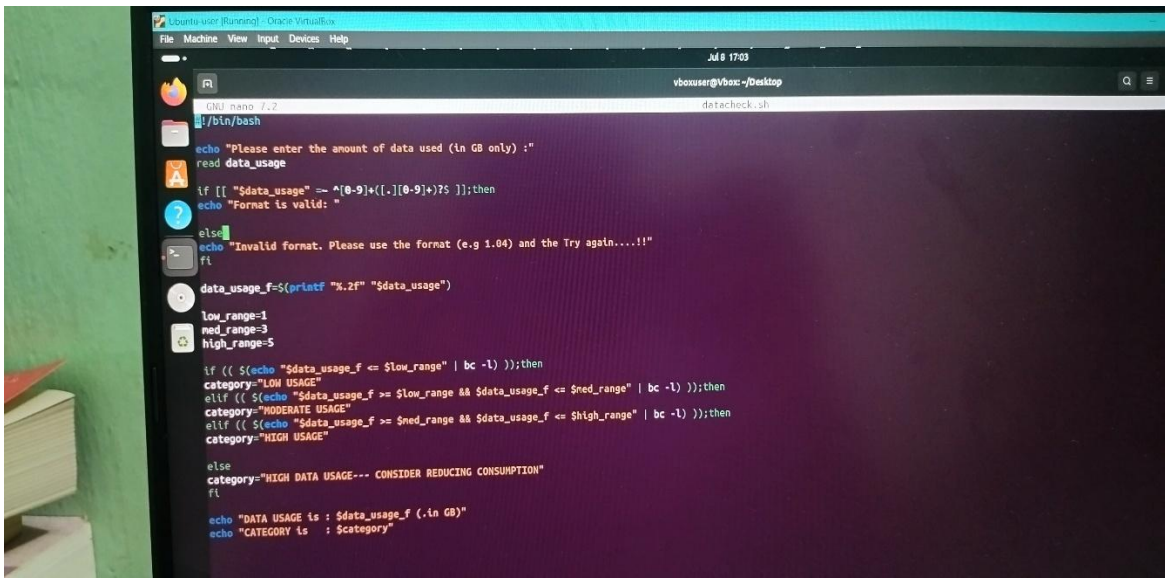
fi

……#displaying the output in terms of Data usage and Category specs

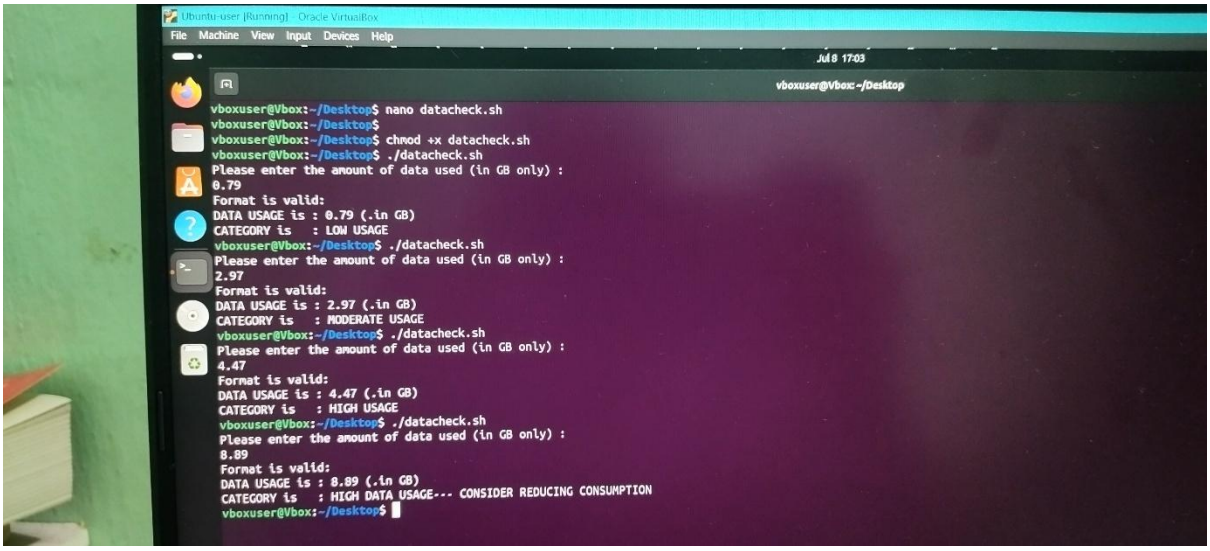
echo “DATA USAGE is : $data_usage_f (.in GB)”

echo “CATEGORY is : $category”

a) Bash script in Vim editor



b)



Question 3: Temperature Monitoring for Cold Storage (5 Marks)

You are designing a monitoring script for a cold storage facility.
Write a shell script that takes the current **temperature in Celsius** as input and:

- Prints **"Critical: Too Cold!"** if the temperature is below 0°C,
- Prints **"Safe Range"** if the temperature is between 0°C and 10°C,
- Prints **"Warning: Too Warm!"** if the temperature is above 10°C.

Use if-elif-else structure with clear **comments explaining each part**.

ANSWER:

```
#!/bin/bash
….# setting up the range for ALERT
Critical_cel=0
Warning_cel=10
….# prompts the user to get the desire temperature (in Celsius)
echo “Enter the value for temperature in Celsius: ”
read temp_cel …# variable as temp_cel to store the prompt value
…..# defining function “temp_check()” to check and display the output
temp_check(){
if (( $(echo “$temp_cel <= $critical_cel” | bc -l) )); then
echo “CRITICAL: TOO COLD…!!!”
```

elif (($(echo “$temp_cel >= $critical_cel && $temp_cel <= $warning_cel” | bc -l)));
then

echo “SAFE RANGE:”

elif (($(echo “$temp_cel >= $warning_cel” | bc -l))); then

echo “WARNING: TOO WARM…!!!”

else …..# else statement if the above operation fails

echo “<<<TEMPERATURE IS OVER THE ACCEPTABLE RANGE>>>”

fi

}

……# regular expression [0-9]+(\.[0-9]+)? used to determine the value.

…..#{^} used to take starting point of the regular expression as a string and {$} ends as followed

……# {~} used to define the extend of the regular expression with the operator for the variable

if [[$(echo “$temp_cel” =~ ^-?[0-9]+(\.[0-9]+)?$]];then

echo “Format is valid :”

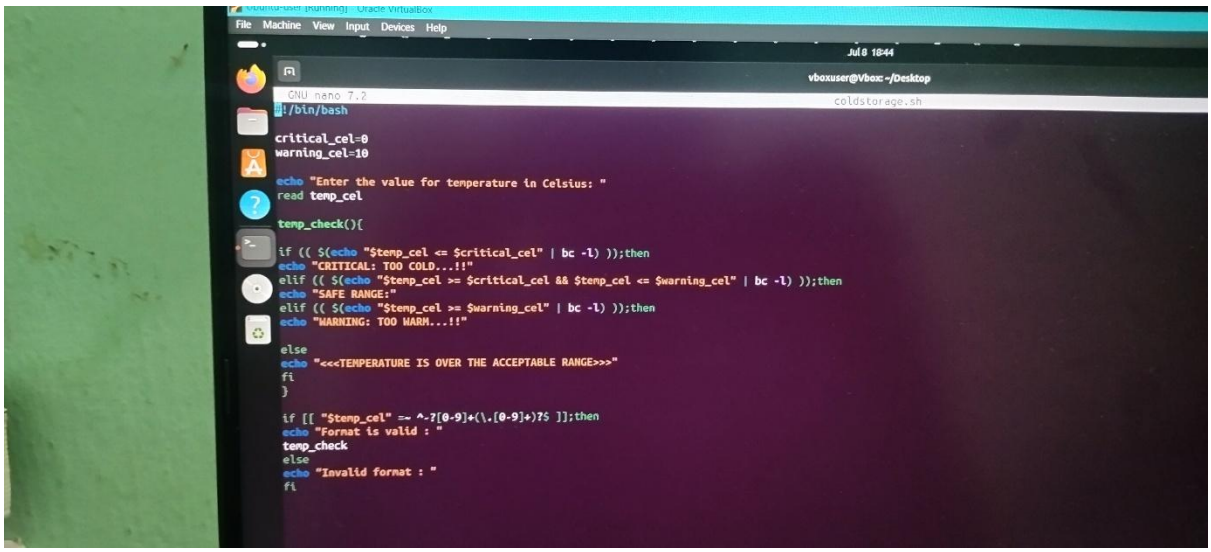
temp_check

else

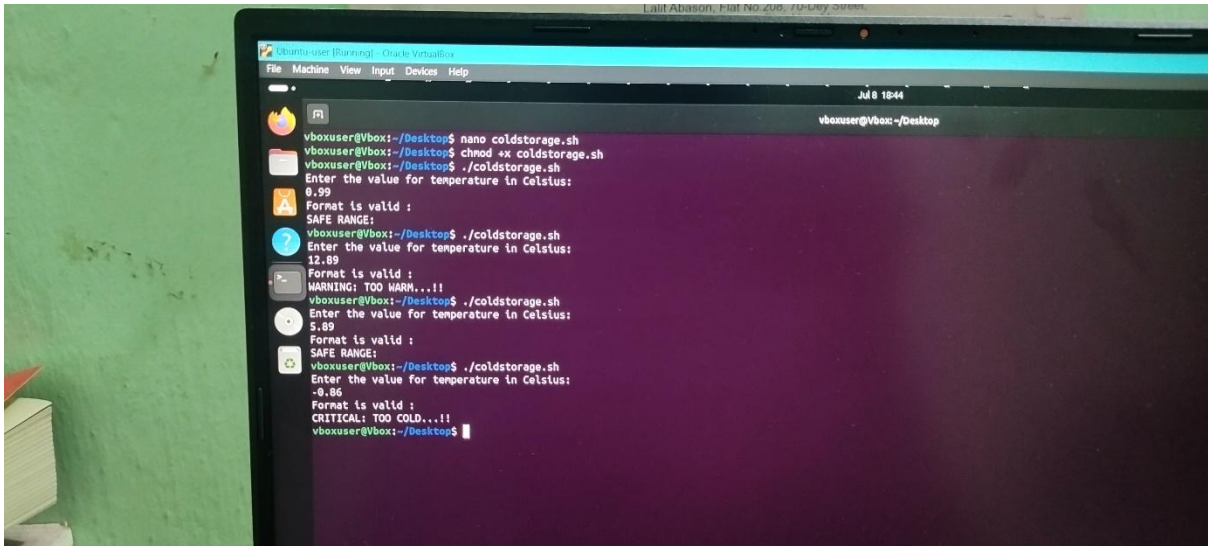
echo “Invalid Format :”

fi

a) Bash script to evaluate TEMPERATURE of the Cold Storage:



b) Ouput:



Question 4:

Define the term "Patent". Explain with an example how software-based patents are filed and provide any one benefit of patenting an invention.

ANSWER:

The term “Patent” signifies the legal rights given to the inventor (also known as Developers in the world of Computers.) which comes under intellectual property that allows inventor to possess certain exclusive rights to their inventions, so that one cannot change or modify the product details or structure without legal permission given to the End User by the Inventors in the form of documents.

<u>One of the example of JAVA patent is given below:</u>

Software patents are more likely to be granted when the software provides a technical solution to a technical problem or improves the functionality of a computer or system.

- Integration with other technologies:
  - Patents may address the integration of Java with other technologies like XML, where innovations in how Java handles XML data are protected.

- Java Card:
  - Specific patents exist for Java Card technology, which is used in smart cards and other secure devices, focusing on applet security and memory management.
  -

SMART CARD
DEVELOPER'S KIT

Since the advent of the Internet, the need for security has grown exponentially. Smart cards provide a secure medium for storing and transporting data. Smart cards have been produced since the 1970s, but until recently have been confined to a small number of government applications such as pay telephones, national health cards, and financial services cards. Smart cards are now used in Europe for many applications, and are becoming more common in the United States as well. Smart cards offer a much wider and more flexible set of customer benefits than magnetic-strip cards or paper records. They also carry secure information—such as medical records, licenses, subscriptions, and accreditations—that must be guarded against tampering.

Smart Card Developer's Kit is designed to provide the practical information you need to design and build applications that incorporate smart cards. Using a combination of detailed exposition, technical reference summaries, and extended examples, this book familiarizes you with the unique strengths and capabilities of this emerging computer technology.

This book includes a SK MultiFlex smart card, which you can use to begin programming smart cards. The book's CD-ROM includes all the source code for the book, EZ Formatter, the CyberFlex and MultiFlex smart card specifications, and a browser-ready collection of HTML pages that can be used as a starting point for finding smart card information and freeware development tools on the Web.

Scott B. Guthery recently joined GemCo to lead the development of a line of cryptographic signing devices. He had previously worked for Schlumberger, where he headed the team that created the first smart card to run a commercial programming language, the Java Card. While at Schlumberger, Dr. Guthery received two patents for his contributions to the design of Schlumberger's M4205 well logging system and also contributed to the development of some novel communication systems for urban terminals such as utility and parking meters. Dr. Guthery received a Ph.D. in probability and statistics from Michigan State University and has published articles in the fields of mathematics, programming languages, and electronic commerce.

Timothy M. Jurgensen is a senior member of the technical staff at Schlumberger's Austin Products Center. He holds a Ph.D. in nuclear physics from Rice University and has been with Schlumberger for more than 25 years. He has been particularly active in the development of small aperture (VSAT) satellite-based communication systems and in the provision of high-security computer networks. These networks are now used by Schlumberger's worldwide operating companies in Oilfield Services to move time-critical exploration and evaluation information from remote well site environments to evaluation offices around the world. He has published articles regarding wide area computer networks, satellite-based communication systems, data management, and network security infrastructures.

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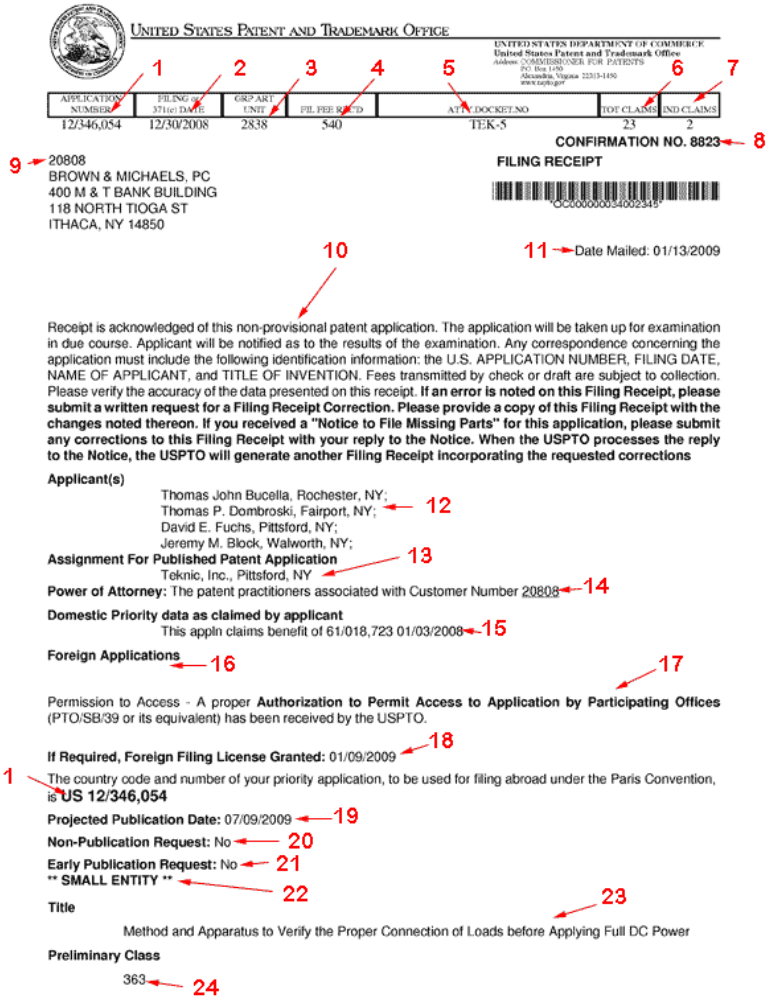
ISBN 1-07870-007-3

M TP

Category: Programming
Covers: Smart Card Technology

- Core Java Technology:
  - Patents cover the fundamental architecture of the Java Virtual Machine (JVM), including features like the constant pool and bytecode verification.
  -



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY DOCKET NO	TOT CLAIMS	IND CLAIMS
12/346,054	12/30/2008	2838	540	TEK-5	23	2

CONFIRMATION NO. 8823

20808
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ITHACA, NY 14850

FILING RECEIPT

Date Mailed: 01/13/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

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Assignment For Published Patent Application

Teknic, Inc., Pittsford, NY

Power of Attorney: The patent practitioners associated with Customer Number 20808

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/018,723 01/03/2008

Foreign Applications

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 01/09/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/346,054**

Projected Publication Date: 07/09/2009

Non-Publication Request: No

Early Publication Request: No

** **SMALL ENTITY** **

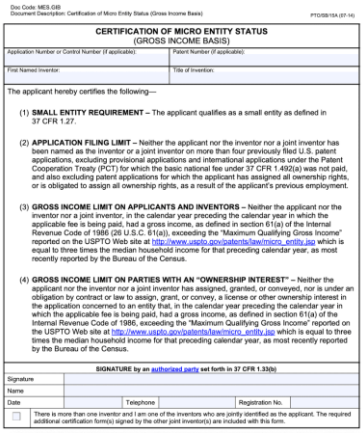
Title

Method and Apparatus to Verify the Proper Connection of Loads before Applying Full DC Power

Preliminary Class

363

- ❖ Java Development Tool Kit:
  - This patent also covers tools used to developing Core Java applications, including methods for generating code from descriptions and for optimizing Java objects.
  -



Doc Code: MES.GIB
Document Description: Certification of Micro Entity Status (Gross Income Basis)
PTO/SB/15A (07-14)

CERTIFICATION OF MICRO ENTITY STATUS
(GROSS INCOME BASIS)

Application Number or Control Number (if applicable)	Patent Number (if applicable)
First Named Inventor	Title of Invention

The applicant hereby certifies the following—

(1) **SMALL ENTITY REQUIREMENT** – The applicant qualifies as a small entity as defined in 37 CFR 1.27.

(2) **APPLICATION FILING LIMIT** – Neither the applicant nor the inventor nor a joint inventor has been named as the inventor or a joint inventor on more than four previously filed U.S. patent applications, excluding provisional applications and international applications under the Patent Cooperation Treaty (PCT) for which the basic national fee under 37 CFR 1.492(a) was not paid, and also excluding patent applications for which the applicant has assigned all ownership rights, or is obligated to assign all ownership rights, as a result of the applicant's previous employment.

(3) **GROSS INCOME LIMIT ON APPLICANTS AND INVENTORS** – Neither the applicant nor the inventor nor a joint inventor, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986 (26 U.S.C. 61(a)), exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census.

(4) **GROSS INCOME LIMIT ON PARTIES WITH AN "OWNERSHIP INTEREST"** – Neither the applicant nor the inventor nor a joint inventor has assigned, granted, or conveyed, nor is under an obligation by contract or law to assign, grant, or convey, a license or other ownership interest in the application concerned to an entity that, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986, exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census.

SIGNATURE by an authorized party set forth in 37 CFR 1.33(b)

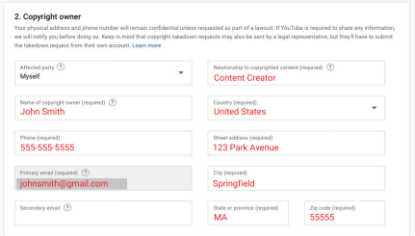
Signature			
Name			
Date	Telephone	Registration No.	

☐ There is more than one inventor and I am one of the inventors who are jointly identified as the applicant. The required additional certification form(s) signed by the other joint inventor(s) are included with this form.

Question 5:

What is the difference between patent and copyright in the context of software development? Provide one scenario for each where they are applicable.

ANSWER:

SL. No	Patent	Copyright
1	The term "Patent" signifies the legal rights given to the inventor (also known as Developers in the world of Computers.) which comes under intellectual property that allows inventor to possess certain exclusive rights to their inventions, so that one cannot change or modify the product details or structure without legal permission given to the End User by the Inventors in the form of documents	Copyright is a exclusive legal right that gives creators (especially for artists) exclusive control over their original works, like books, music, and art, preventing others from copying, sharing, or selling them without permission.
2	In the context of software, this means the patent holder can prevent others from using, making, or selling the patented software without permission.	In the context of software, Copyright protects the specific way the code is written (the expression), not the underlying concept or functionality (the idea)
3	This exclusive right is not indefinite. It's granted for a specific period of Time, after which the invention becomes public domain and anyone can use it.	Copyright protection lasts for a significant period, often the creator's lifetime plus a number of years, after which the work becomes part of the public domain.
4	For example, while copyright protects the specific lines of code in a software program, a patent protects the underlying algorithm or method used in that program.	Copyright protection is generally automatic upon creation of the software, though registration can provide additional benefits like public record of ownership and enhanced legal recourse in case of infringement.
5	Example: 	Example: 

Question 6:

How can you protect it under intellectual property rights?

Which legal protection (patent, copyright, trademark) would apply? Justify your answer.

ANSWER:

Since the Software is purely developed by the Individual Development. Copyright is a form of protection provided by the laws of the various countries to the authors of "original works of authorship" in context to some certain other intellectual works as well as computer software.

- Exclusive Rights and Control:
  - Copyright gives developers the exclusive right to reproduce, distribute, and create derivative works (like modified versions) of their software.
  - It allows them to control who can use the software and under what conditions, such as through licensing agreements.
  - This control is crucial for maintaining the value of the software and preventing unauthorized use.
- Preventing Infringement:
  - Copyrights protect against software piracy unauthorized copy and distribution which can impact revenue and reputation.
  - It provides legal right against illegal infringement and seeking remedies like injunctions and damages.
- Fostering Innovation:
  - By safeguarding their creations, copyright encourages developers to invest time and resources in creating new and innovative software.
  - It allows them to reap the benefits of their work, fostering a competitive market.
- Enhancing Professional Credibility:
  - Copyright registration can enhance developer's professional image, signalling that their inventions legit and are under law protection.

- It can be valuable asset for the developers in negotiations with the collaborators, clients and investors.

➢ Supporting Licensing Agreements:

- Copyright forms the foundation for licensing agreements, which define how software can be used, modified, or distributed by others.
- It ensures that licensing terms are legally enforceable, protecting both the developer and the license holders.