MULTIMEDIA UNIVERSITY®

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TDF3241
DIGITAL FORENSICS

Trimester 2, Session 2022 / 2023

PROJECT

GROUP NAME: Matrix

BY

No.	Student ID	Student Name	Course Majoring
1.	119110577	Siah Kah Chuan	Security Technology
2.	1181103380	Alvin Kua Chee Shern	Security Technology
3.	1191101497	Foo Haw Liang	Security Technology
4.	1191101340	Grayson Goh Jin Yi	Security Technology

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Rubric Assessment for Project

Assessment Criteria	Sub-criteria	Poor	Minimal	Satisfactory	Good	Excellent	Marks
Subject Knowledge (50%) CLO3: Report aspects of an ethical computer forensics investigation for corporate or court cases into investigative reports	Percentage of Marks allocated	0%-5%	6%-39%	40%-50%	51%-70%	71%-100%	
	Documentation/ Description (10%)	No documentation (0-0.5 marks)	Documentation is too simple with simple comments; analysis is not provided (0.51-3.9 marks)	Documentation contains simple comments and analysis is provided but not correct (4-5 marks)	Documentation is moderately written comments and analysis is correct but not complete (5.1-7 marks)	Documentation is well-written and analysis is correct and complete (7.1-10 marks)	
CLO2: Demonstrate findings by analysing forensic evidences from seized digital devices and digital images.	Research and Analysis Done (15%)	No research or analysis done (0-.075 marks)	Research and analysis done is too simple and very minimal (0.76-5.85 marks)	Research and analysis done emphasizes and supports knowledge covered in class or textbook with references to support (5.86-7.5 marks)	Research and analysis done contains new knowledge not covered in class, textbook or syllabus with references to support (7.51-10.5marks)	Research and analysis done contains new/novel knowledge and new cutting edge revolutionary ideas with references to support (10.51-15 marks)	
	Creativity and maturity of thought process in Analysis and Solution (5 %)	No creativity in thought process (0-0.25 marks)	Minimal creativity in thought process (0.26-1.95 marks)	Simple or basic creativity in thought process (1.96-2.5 marks)	Good creativity and maturity in thought process (2.51-3.5 marks)	Excellent creativity and maturity in thought process (3.51-5 marks)	
	Full knowledge of both problem and solution / Assignment (15%)	Little or no understanding of requirements (0-0.75 marks)	Poor understanding of fundamentals (0.76-5.85 marks)	Adequate understanding of fundamentals (5.86-7.5 marks)	Good depth of understanding of fundamentals (7.51-10.5 marks)	Excellent depth of knowledge of fundamentals (10.51-15 marks)	

TDF3241

Digital Forensics

Project Evaluation Form

Trimester 2, 2022/2023

Total Marks : 50%

Student ID	Student Name	Peer Evaluation (CLO2) (5%)	Documentation/ Description (CLO3) (10%)	Research and Analysis Done (CLO2) (15%)	Creativity and maturity of thought process in Analysis and Solution (CLO 2) (5 %)	Full knowledge of both problem and solution / Assignment (CLO2) (15%)	TOTAL (50%)
119110577	Siah Kah Chuan						
1181103380	Alvin Kua Chee Shern						
1191101497	Foo Haw Liang						
1191101340	Grayson Goh Jin Yi						

Note: This Evaluation form MUST be attached after the cover page of report during the submission.

Task Distribution

This is to confirm that my submission for this assignment is complete and final. I declare that it is my original work and I have not engaged in any form of plagiarism in producing it. I understand that plagiarism is a serious offence that will be penalized accordingly

Student ID	Student Name	Task Done	Signature
119110577	Siah Kah Chuan	- Logs of conducting forensic analysis (list down the steps of how to conduct forensic analysis) - Snapshot of evidence - Description of forensic tools used - Generate raw image of android phone	
1181103380	Alvin Kua Chee Shern	- Analyse in-app chatting history(soul)	
1191101497	Foo Haw Liang	- Intro and Conclusion - Chain of custody - Single/multiple evidence form - Schedule of forensic analyse (gantt chart)	
1191101340	Grayson Goh Jin Yi	- Analyse deleted files - Categorised findings	

PART 1: INTRODUCTION

1 Introduction

The purpose of this report is to provide a comprehensive analysis of the investigation conducted on the mobile phone seized from Mr. Mathew Choi, who is suspected of engaging in fraudulent activities targeting vulnerable individuals on dating apps, Soul. As a computer forensics analyst, the task at hand was to uncover evidence of fraud, identify victims, and gather enough information to support the prosecution's case against Mr. Choi.

1.1 Summary of Case and Tasking

The investigation pertains to Mr. Mathew Choi, who is suspected of being a scammer preying on vulnerable single ladies and extorting money from them on dating apps Soul. The police have seized his mobile phone. The objective of this investigation is to find evidence of fraud and identify the victims to support the prosecutor in their case against Mr. Choi. No additional information has been provided, and the analysis must rely solely on the contents of the seized phone, including potentially deleted files. The investigation aims to gather sufficient evidence to prosecute Mr. Choi.

1.2 Statement of Compliance

As a computer forensics analyst, it is crucial to understand the duty as an expert witness to provide independent and unbiased assistance in matters within my expertise. It is my responsibility to offer objective opinions based on the findings of the investigation. In the event that any material issues arise or my opinion changes on significant matters, all relevant parties will be promptly informed.

Throughout the investigation, strict adherence to formal procedures and the chain of custody has been followed to maintain the integrity of the evidence. This report will document the equipment used, including the type and specifications, the version of forensics tools employed, and the skill level of the team members involved in the analysis. The timespan of the investigation and analysis will also be included to provide context for the efforts made.

To ensure the transparency and accuracy of the investigation, screenshots of the entire investigation process will be included in the report. Additionally, all recovered files will be categorized, and their locations, storage areas examined, and relevant details will be logged following standard forensic practices. This report aims to provide a comprehensive analysis of the evidence found on Mr. Choi's seized mobile phone, serving as a reliable resource for the prosecution in building their case.

PART 2: FORENSIC EXAMINATION

2.1 Tools

The tools that are utilized in this project were listed as below:

- **Android Management Tools** – SDK Platform tools (v34.0.1)

  Android SDK Platform-Tools is a component for the Android SDK. Adb and fastboot are the main tools that it includes for interacting with the Android platform. App developers typically only utilise the copy Studio installs, even though adb is necessary for Android app development. If you don't have Studio installed and wish to use adb straight from the command-line, this download is helpful.

- **Samsung Flashing Tools** – Odin (v3.14.1)

  Odin is the most widely used flashing tool for Samsung smartphones and tablets, and it was leaked by Samsung Inc. Odin is a lightweight, yet powerful, application that is frequently used by Android users worldwide. To flash your device's firmware, you must first boot it into Download mode (Odin mode). Odin is currently only compatible with Windows, but if you need alternatives for Linux or MAC OS, you can utilise Heimdall. XDA developers and the Odin Android community are working hard to give the most up-to-date direct download links and many types of usages.

- **Android Root Checking Tools** – SuperSU (v2.82)

  SuperSU is a defunct proprietary Android software that can track programme root permissions once the Android device has been rooted. SuperSU is typically installed using a custom recovery like TWRP.and it has the ability to undo rooting.

- **Custom Startup Program** – TWRP (v3.7.0)

  TWRP (pronounced "twrp") is an open-source software custom recovery image for Android smartphones. It has a touchscreen-enabled interface that allows users to install third-party firmware and backup their current system, which are tasks that are often not supported by standard recovery images. It is so frequently installed while flashing, installing, or rooting Android devices, however it is not necessary for a device to be rooted before installation.

- **Network Utilities Tools** – Netcat (v7.93)

  A networking tool called Netcat uses the TCP/IP protocol to read and write data across network connections. A secure back-end tool called Netcat can be used to transport files straight from a client to a server and back again while working with other programmes and scripts. It also functions as a feature-rich platform for network debugging and research, allowing users to define network parameters and establish tunnel connections to distant hosts.

- **Digital Forensic Tools** – Autopsy (v4.20.0)

  Autopsy is a digital forensics platform and graphical interface to The Sleuth Kit and other digital forensics tools. For the purpose of looking into what occurred on a computer, law enforcement, the military, and corporate examiners employ it. Even photo recovery from the memory card of your camera is possible with it. In essence, the autopsy is a free open-source programme that supports a variety of other modules and tools for digital forensics. Many of the open-source applications and plugins utilised in The Sleuth Kit can be more easily deployed thanks to the computer programme known as The Autopsy. The graphical user interface makes it simpler for investigators to identify pertinent data sections by displaying the findings from the forensic search of the underlying volume.

2.2 Hash Values

The file name and associated hash values were listed as below:

- **First image file** – android.dd

  MD5: 856F828E0BF08BAEBB4134EB488A5C96
  SHA-1: 5CF924336A7E4561EE766DE55FF0668D4A91DC43

- **Second image fie** – android2.dd

  MD5: 856F828E0BF08BAEBB4134EB488A5C96
  SHA-1: 5CF924336A7E4561EE766DE55FF0668D4A91DC43

- **Third image file** – android3.dd

  MD5: 856F828E0BF08BAEBB4134EB488A5C96
  SHA-1: 5CF924336A7E4561EE766DE55FF0668D4A91DC43

We will have 3 images file whereby adroid.dd file is the one where we used it to perform forensic analysis and other 2 images file are for backup purposes. All these files are identical as their hash value appears to be the same. The images file is checked against its initial hash value after each major operation. The result shown that the hash value remains the same and thus we can conclude that the image file does not lose its integrity throughout the forensic process.

2.3 Chain of Custody

Table 2.1 Evidence custody form

EVIDENCE CHAIN OF CUSTODY TRACKING FORM

Case Number: ____TDF3241___________________

Submitting Officer: (Name/ID#) __Ts.Dr. Ho Yean Li_____________________

Victim: Mr. Mathew Choi________

Suspect: Ms. Lily Tan_______ Date/Time Seized: ___12 April 2023____

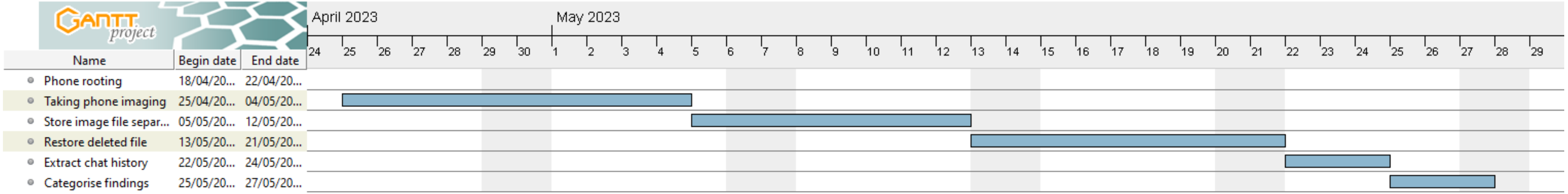
Location of Seizure: MMU

Description of Evidence		
Item #	**Quantity**	**Description of Item (Model, Serial #, Condition, Marks, Scratches)**
1	1	Samsung Galaxy J5(2016) Size: 16GB

Chain of Custody				
Item #	**Date/Time**	**Released by (Signature & ID#)**	**Received by (Signature & ID#)**	**Comments/Location**
1	18 April 2023	Siah Kah Chuan	Foo Haw Liang	Phone has been rooted. All the progress and data are not altered
2	25 April 2023	Siah Kah Chuan	Foo Haw Liang	Phone imaging has been taken. The file hashes also has been taken to ensure the integrity of the file.

3	5 May 2023	Siah Kah Chuan	Foo Haw Liang	File hashes has been checked to ensure the integrity of the file. Image file is store in separate folder to prevent the commingle of data
4	13 May 2023	Grayson Goh Jin Yi	Foo Haw Liang	File hashes has been checked to ensure the integrity of the file. Some of the deleted file has been restored by forensic experts to be used as evidence
5	22 May 2023	Alvin Kua Chee Shern	Foo Haw Liang	File hashes has been checked to ensure the integrity of the file. In app chat history has been extracted by forensic experts to serve as prove of the web scamming
6	25 May 2023	Grayson Goh Jin Yi	Foo Haw Liang	File hashes has been checked to ensure the integrity of the file. All the evidence and findings has been categorised according to their type to prevent the commingle of data

2.4 Schedule of forensic analysis



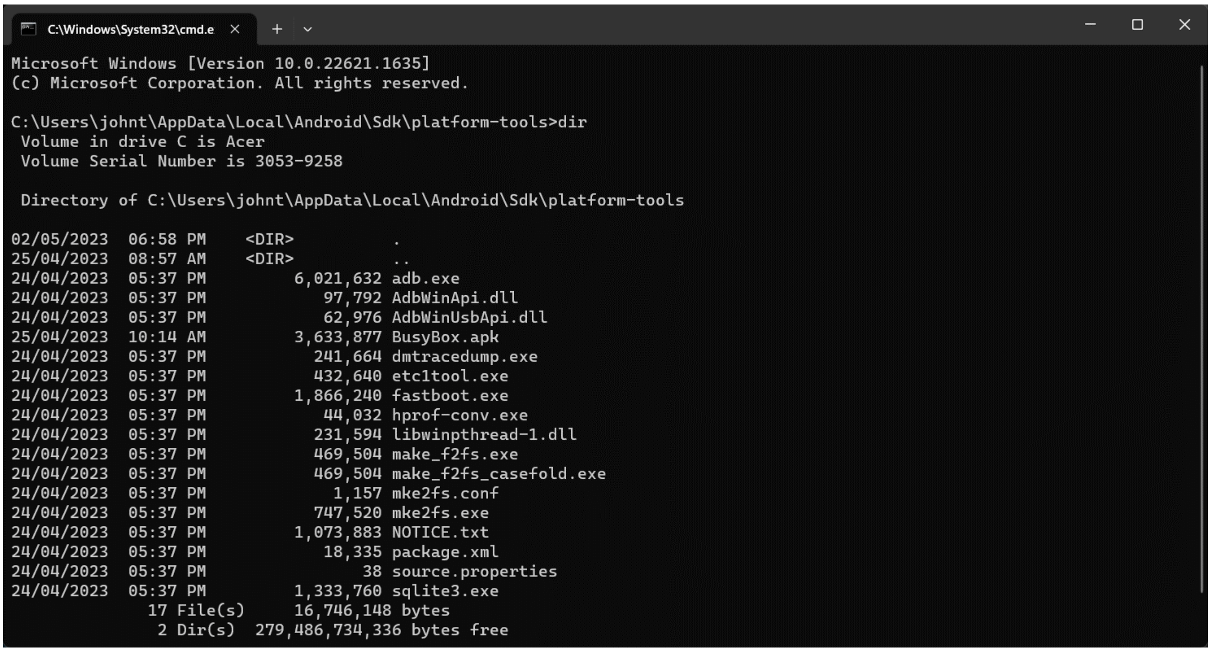
Name	Begin date	End date
Phone rooting	18/04/20...	22/04/20...
Taking phone imaging	25/04/20...	04/05/20...
Store image file separ...	05/05/20...	12/05/20...
Restore deleted file	13/05/20...	21/05/20...
Extract chat history	22/05/20...	24/05/20...
Categorise findings	25/05/20...	27/05/20...

Table 2.1 Gantt Chart

PART 3: FORENSIC ANALYSIS

3.1 Preparation work before conducting forensic analysis.

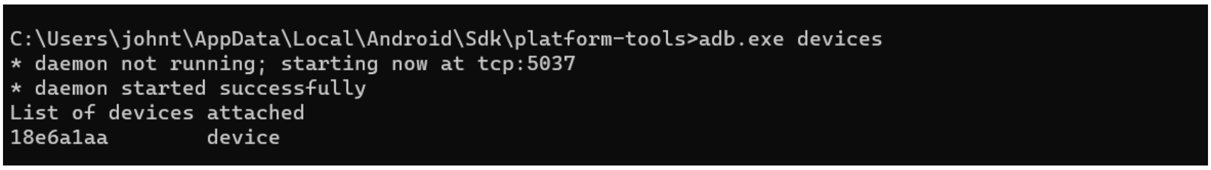
Getting a raw image file on android device is not an easy task. There are some preparation works that need to be carried out to have a smooth forensic analysis process. The devices need to be rooted to allow investigator to have the root access level when performing investigation. Since the operating system platform of forensic workstation chosen is window, there are a few software that needed to be downloaded onto window. Among it would be SDK platform tools for providing tools need to analysis android phone, and ncat tools. After that, open up window command line terminal and navigate to the folder where all the tools are downloaded.



```
Microsoft Windows [Version 10.0.22621.1635]
(c) Microsoft Corporation. All rights reserved.

C:\Users\johnt\AppData\Local\Android\Sdk\platform-tools>dir
 Volume in drive C is Acer
 Volume Serial Number is 3053-9258

 Directory of C:\Users\johnt\AppData\Local\Android\Sdk\platform-tools

02/05/2023  06:58 PM    <DIR>          .
25/04/2023  08:57 AM    <DIR>          ..
24/04/2023  05:37 PM         6,021,632 adb.exe
24/04/2023  05:37 PM            97,792 AdbWinApi.dll
24/04/2023  05:37 PM            62,976 AdbWinUsbApi.dll
25/04/2023  10:14 AM         3,633,877 BusyBox.apk
24/04/2023  05:37 PM           241,664 dmtracedump.exe
24/04/2023  05:37 PM           432,640 etc1tool.exe
24/04/2023  05:37 PM         1,866,240 fastboot.exe
24/04/2023  05:37 PM            44,032 hprof-conv.exe
24/04/2023  05:37 PM           231,594 libwinpthread-1.dll
24/04/2023  05:37 PM           469,504 make_f2fs.exe
24/04/2023  05:37 PM           469,504 make_f2fs_casefold.exe
24/04/2023  05:37 PM             1,157 mke2fs.conf
24/04/2023  05:37 PM           747,520 mke2fs.exe
24/04/2023  05:37 PM         1,073,883 NOTICE.txt
24/04/2023  05:37 PM            18,335 package.xml
24/04/2023  05:37 PM                38 source.properties
24/04/2023  05:37 PM         1,333,760 sqlite3.exe
              17 File(s)     16,746,148 bytes
               2 Dir(s)  279,486,734,336 bytes free
```

Figure 3.1a List of file stored in the working folder on forensic workstations

Next steps would be connecting the window forensic workstation to suspect android phone, and type the "adb.exe devices" to ensure the connection is successful.



```
C:\Users\johnt\AppData\Local\Android\Sdk\platform-tools>adb.exe devices
* daemon not running; starting now at tcp:5037
* daemon started successfully
List of devices attached
18e6a1aa        device
```

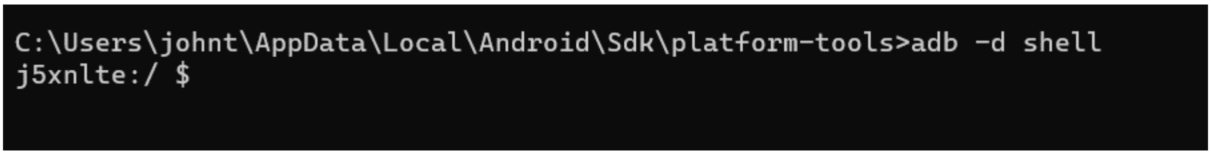
Figure 3.1b List of connected devices

After that we need to use the "adb -d install Busybox.apk" command to install the software onto suspect phone.

Before moving on to configure the suspect phone, we will also need to download odin which is used to install custom startup program on suspect phone from this url: ODIN. Another things to be downloaded would be TWRP software for the suspect phone model which is serves as custom startup program on phone and also download supersu program from this url: SuperSU. After that, transfer the supersu program to phone.

Next, we move to the phone side and turn on the developer mode in android phone by tapping 7 times on the build number. Once developer mode is turned on, we need to enable the OEM unlock and USB debugging. Then, we need to locate the Busybox software on phone and tap on the install button inside busybox software to install the required libraries. After that, we need to shut down the phone. Once phone is completed shut down, press the vol-down + home + start button simultaneously (button involved might be various according to phone model). Next, user will be landed to custom OS page on phone, and they can open up the odin software on window workstation and install the twrp program to phone. After that, force shutdown the phone and press vol-up + home + start button simultaneously to enter the TWRP program. Find the install option under TWRP program and instal the supersu program. Once installation process is completed, reboot the phone.

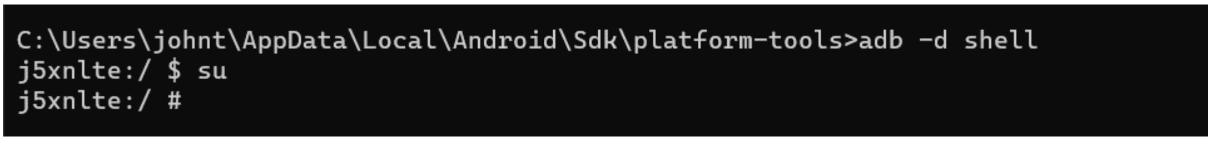
Once the everything is configured and the phone is rooted, we can go back to our window forensic workstation and type the command “adb -d shell” to enter the shell of suspect phone.



```
C:\Users\johnt\AppData\Local\Android\Sdk\platform-tools>adb -d shell
j5xnlte:/ $
```

Figure 3.1c Calling the shell of connected phone devices

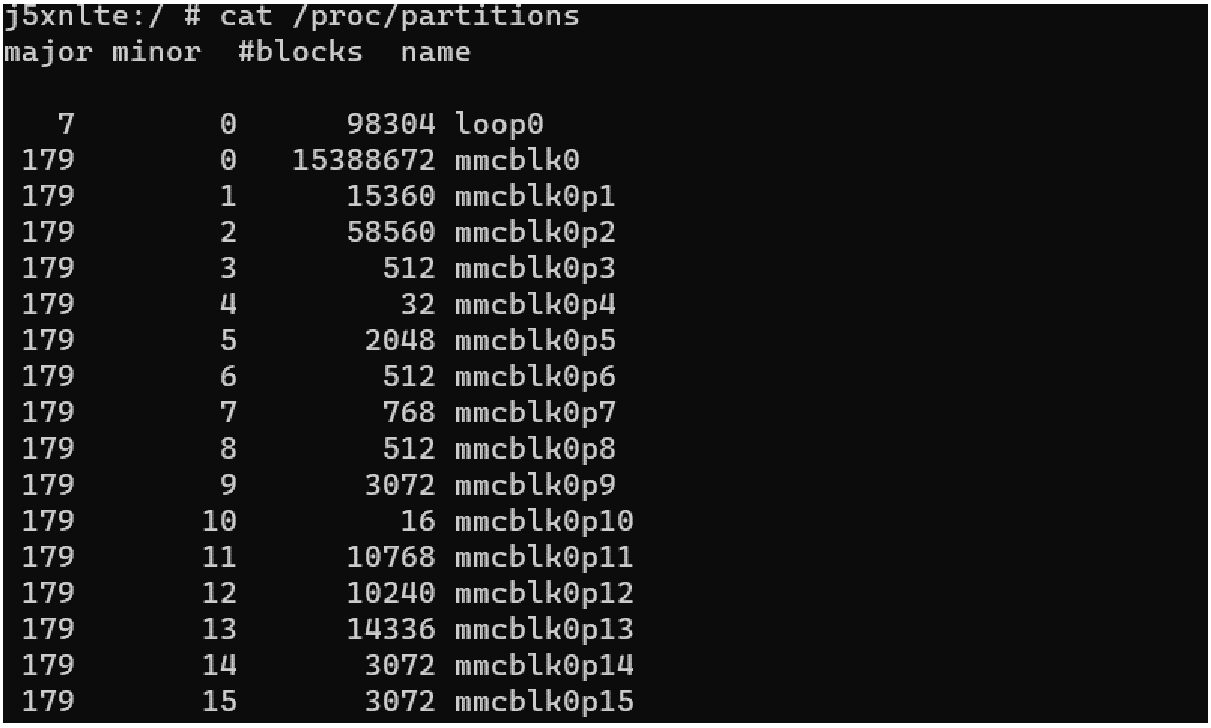
Change to root user by using “su” command



```
C:\Users\johnt\AppData\Local\Android\Sdk\platform-tools>adb -d shell
j5xnlte:/ $ su
j5xnlte:/ #
```

Figure 3.1d Change to root user

Next, type the command “cat /proc/partitions” to read the phone disk partition.

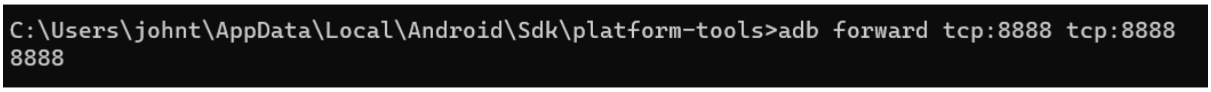


```
j5xnlte:/ # cat /proc/partitions
major minor  #blocks  name

   7        0      98304 loop0
 179        0   15388672 mmcblk0
 179        1      15360 mmcblk0p1
 179        2      58560 mmcblk0p2
 179        3        512 mmcblk0p3
 179        4         32 mmcblk0p4
 179        5       2048 mmcblk0p5
 179        6        512 mmcblk0p6
 179        7        768 mmcblk0p7
 179        8        512 mmcblk0p8
 179        9       3072 mmcblk0p9
 179       10         16 mmcblk0p10
 179       11      10768 mmcblk0p11
 179       12      10240 mmcblk0p12
 179       13      14336 mmcblk0p13
 179       14       3072 mmcblk0p14
 179       15       3072 mmcblk0p15
```

Figure 3.1e List of available partitions

Open up another command prompt and navigate to the folder where SDK tools is located.

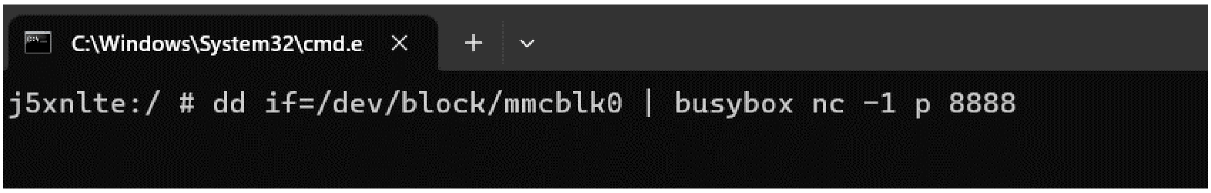
Type the command “adb forward tcp:8888 tcp:8888” in your window forensic workstation to allow your pc get all the connections to phone



```
C:\Users\johnt\AppData\Local\Android\Sdk\platform-tools>adb forward tcp:8888 tcp:8888
8888
```

Figure 3.1f Forwarding connection

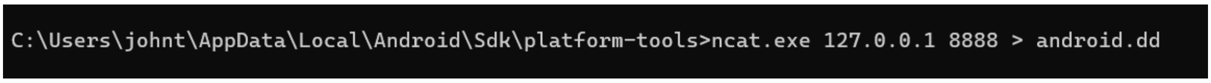
After that, type the command “dd if=/dev/block/mmcblk0 | busybox nc -1 p 8888” in phone shell to setup a listener on phone



```
j5xnlte:/ # dd if=/dev/block/mmcblk0 | busybox nc -1 p 8888
```

Figure 3.1g Setting up a listener

After that type the command “ncat.exe 127.0.0.1 8888 > android.dd” onto the cmd of window workstation to get the information from phone to generated it to a raw image file.



```
C:\Users\johnt\AppData\Local\Android\Sdk\platform-tools>ncat.exe 127.0.0.1 8888 > android.dd
```

Figure 3.1h Generate raw image file

After that, wait for the copying process to complete.

3.2 Steps to conduct forensic analysis.

Open up autopsy forensic tool and click on new case option

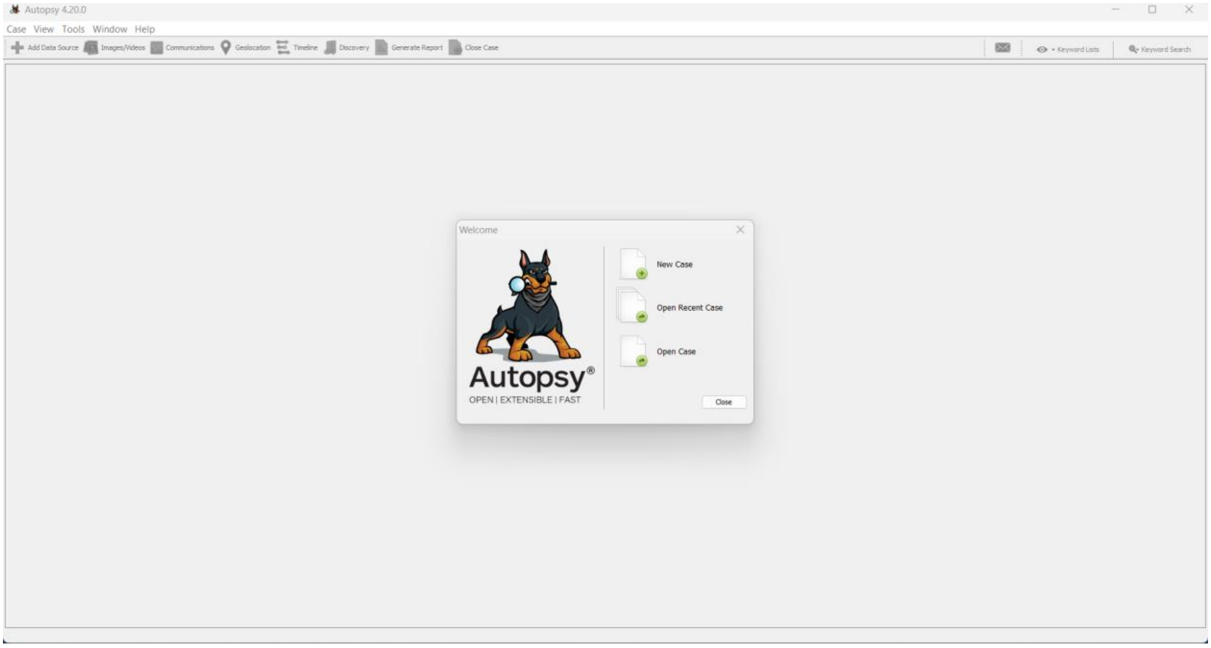
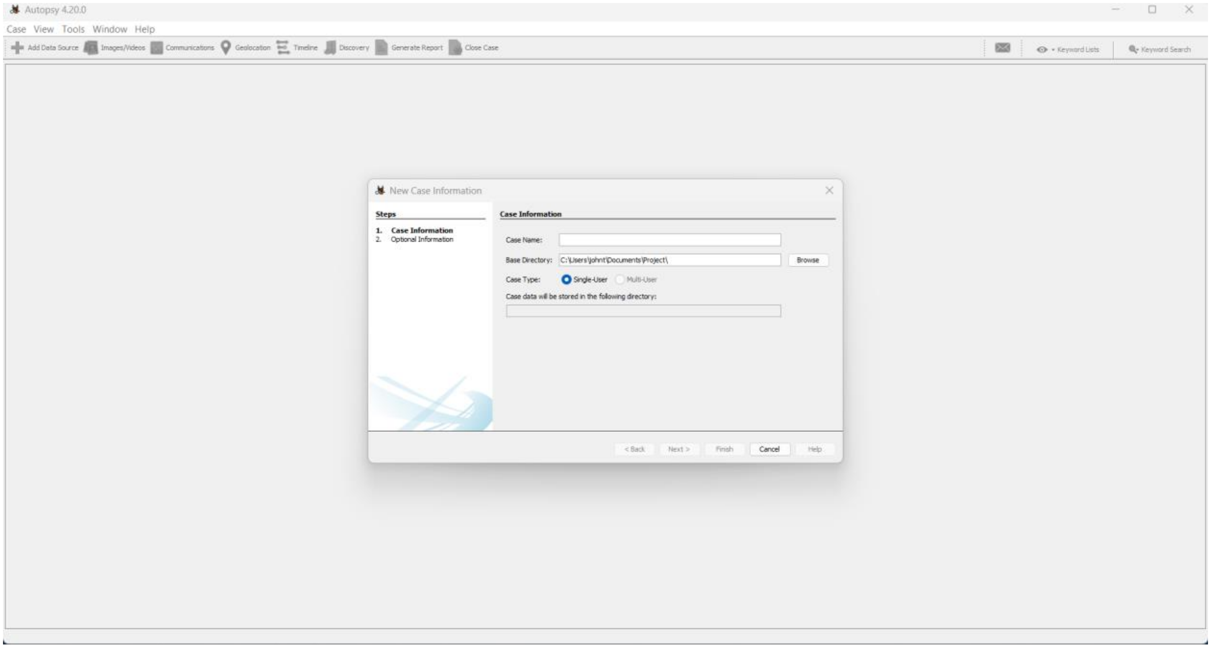


Figure 3.2a Option for case

Fill up the case name



Steps

1. Case Information
2. Optional Information

Case Information

Case Name:

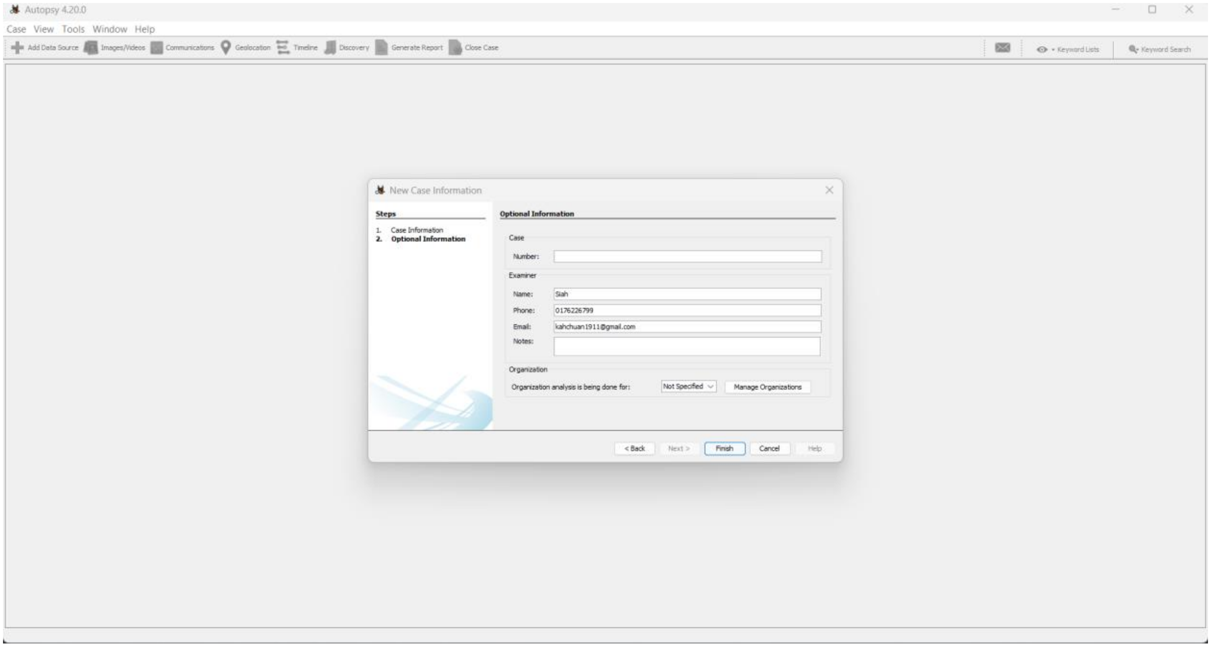
Base Directory: C:\Users\johnt\Documents\Project\

Case Type: ● Single-User ○ Multi-User

Case data will be stored in the following directory:

Figure 3.2b Information about case

Fill up the case number, examiner name, examiner phone, examiner email



Optional Information

Case

Number:

Examiner

Name: Siah

Phone: 0176226799

Email: kahchuan1911@gmail.com

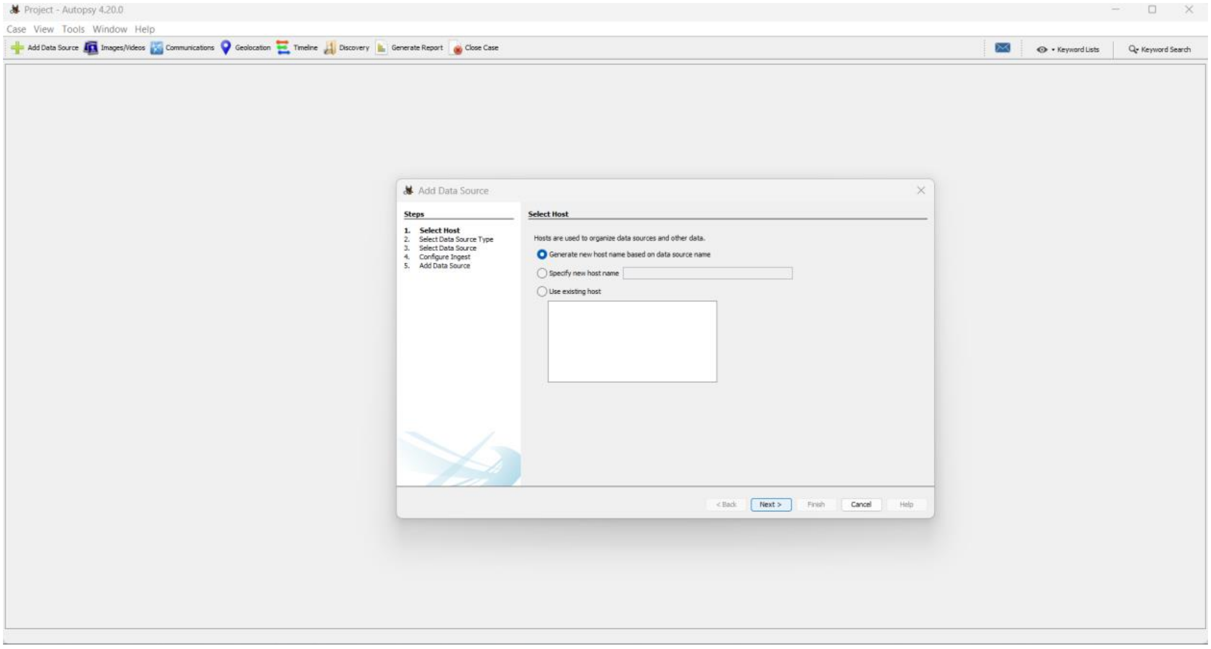
Notes:

Organization

Organization analysis is being done for: Not Specified

Figure 3.2c Information about examiner

Select generate new host name based on data source name



Select Host

Hosts are used to organize data sources and other data.

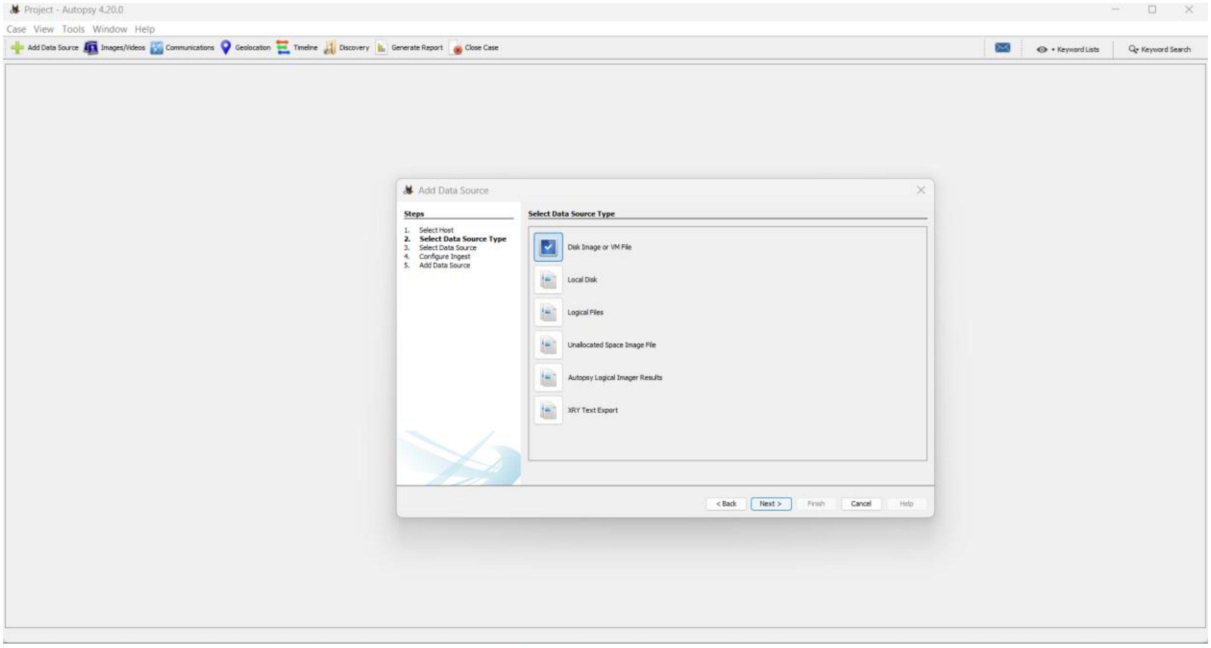
● Generate new host name based on data source name

○ Specify new host name

○ Use existing host

Figure 3.2d Information about host

Select the disk image or VM file option



Steps

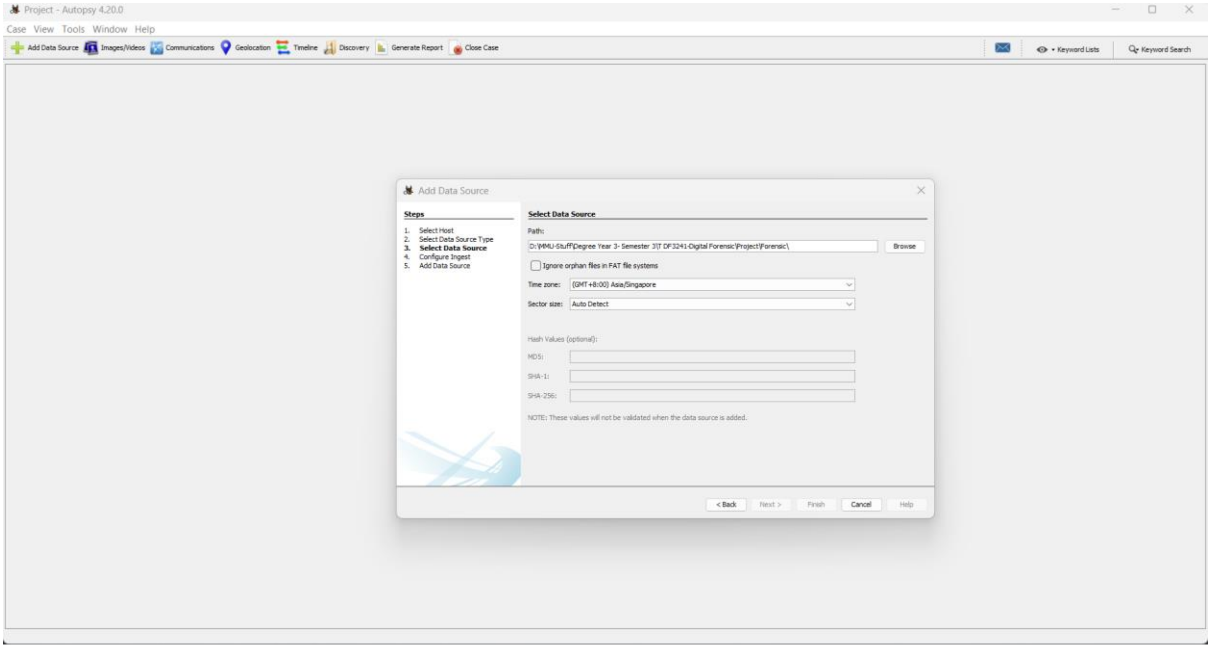
1. Select Host
2. **Select Data Source Type**
3. Select Data Source
4. Configure Ingest
5. Add Data Source

Select Data Source Type

- Disk Image or VM File
- Local Disk
- Logical Files
- Unallocated Space Image File
- Autopsy Logical Imager Results
- XRY Text Export

Figure 3.2e Selecting evidence source type

Locate where is the image file stored



Steps

1. Select Host
2. Select Data Source Type
3. **Select Data Source**
4. Configure Ingest
5. Add Data Source

Select Data Source

Path: D:\MMU-Stuff\Degree Year 3- Semester 3\TDF3241-Digital Forensic\Project\Forensic\

☐ Ignore orphan files in FAT file systems

Time zone: (GMT+8:00) Asia/Singapore

Sector size: Auto Detect

Hash Values (optional):

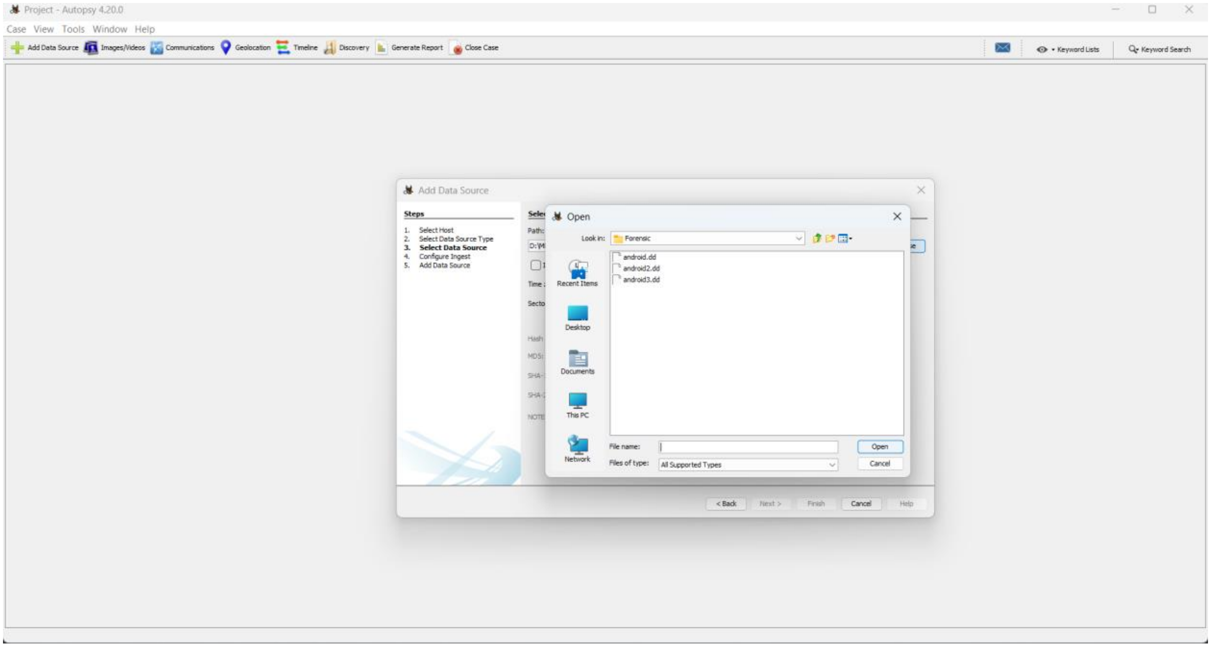
MD5:

SHA-1:

SHA-256:

NOTE: These values will not be validated when the data source is added.

Figure 3.2f Selecting evidence source



Steps

1. Select Host
2. Select Data Source Type
3. **Select Data Source**
4. Configure Ingest
5. Add Data Source

Look in: Forensic

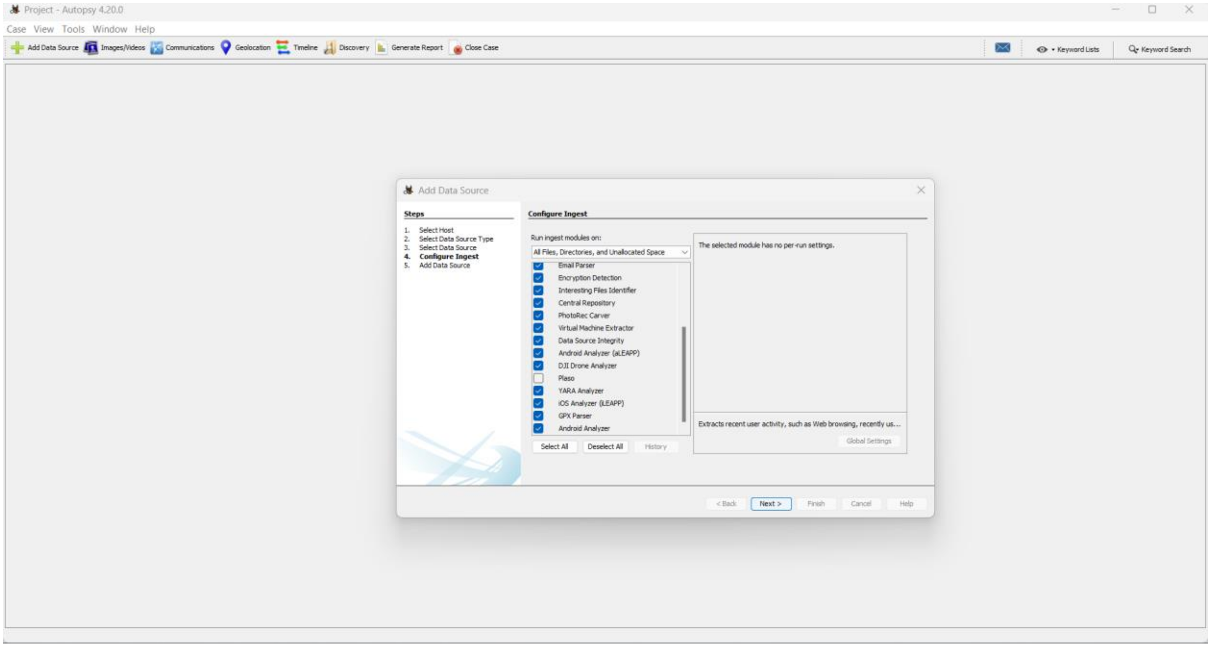
android.dd
android2.dd
android3.dd

File name:

Files of type: All Supported Types

Figure 3.2g Locating evidence source

Configure the ingest, especially tick on the android analyzer (aLEAPP) and android analyser to enable processing for android phone



Steps

1. Select Host
2. Select Data Source Type
3. Select Data Source
4. **Configure Ingest**
5. Add Data Source

Configure Ingest

Run ingest modules on: All Files, Directories, and Unallocated Space

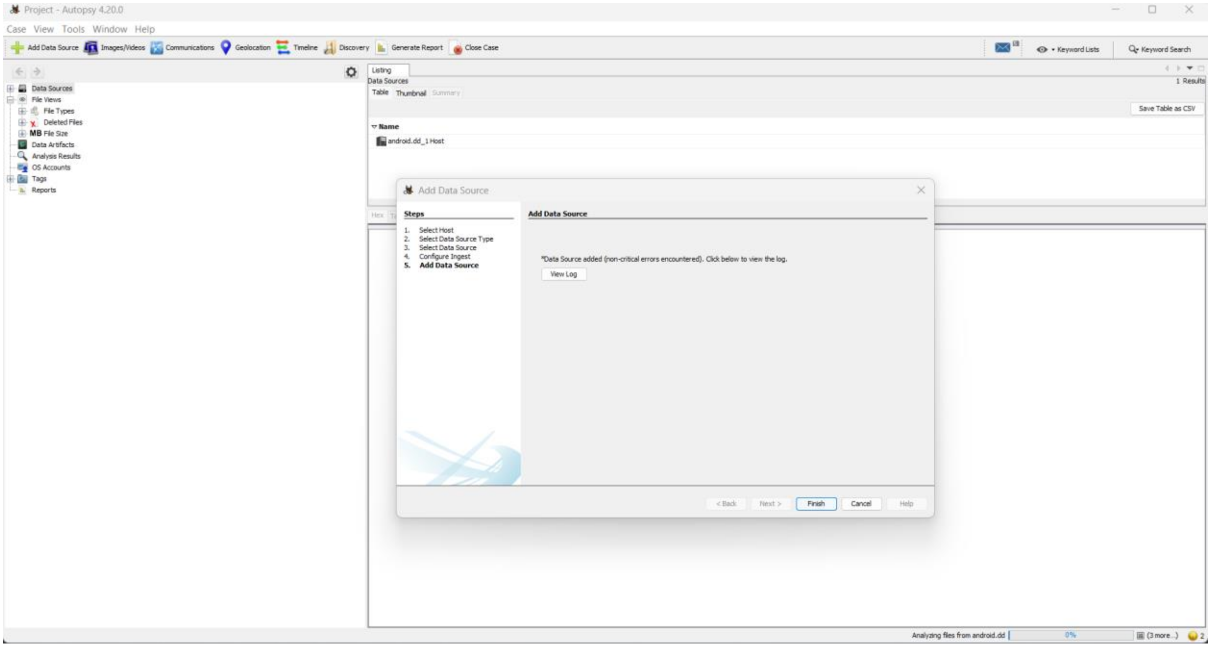
☑ Email Parser
☑ Encryption Detection
☑ Interesting Files Identifier
☑ Central Repository
☑ PhotoRec Carver
☑ Virtual Machine Extractor
☑ Data Source Integrity
☑ Android Analyzer (aLEAPP)
☑ DJI Drone Analyzer
☐ Plaso
☑ YARA Analyzer
☑ iOS Analyzer (iLEAPP)
☑ GPX Parser
☑ Android Analyzer

The selected module has no per-run settings.

Extracts recent user activity, such as Web browsing, recently us...

Figure 3.2h Configure Ingest

Click on next and finish once the image is finished loading.



*Data Source added (non-critical errors encountered). Click below to view the log.

Figure 3.2i Finish up the rest of setting

3.3 Evidence Classes

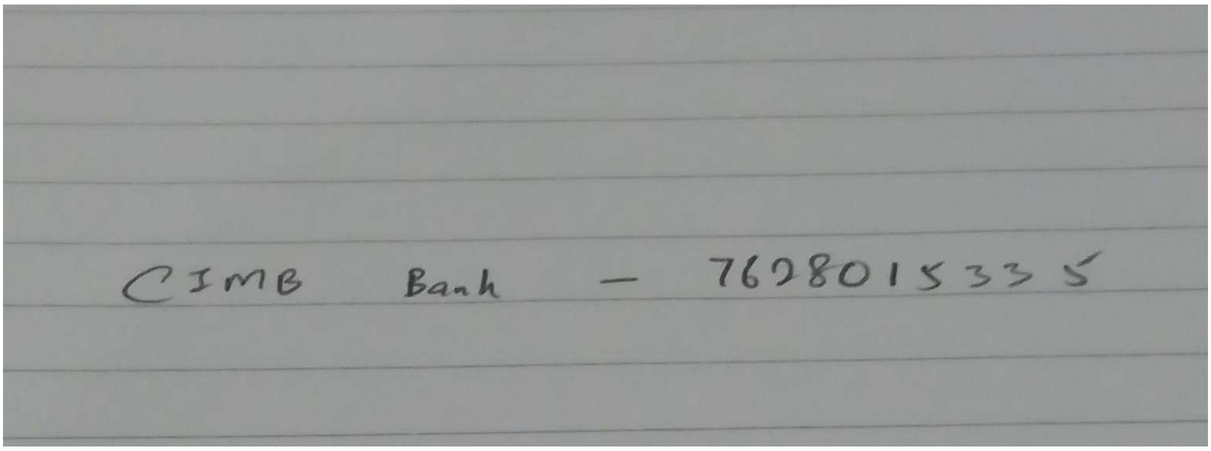
Evidence extracted below are belief to be able to press charges on Mathew Choi under the crime of internet fraud.

Table 3.3 Overview of evidence class

Evidence Class	Description	Type
1	Recovered deleted file from Mathew Choi's phone that can be served as solid evidence	.jpeg
2	Chat history between Mathew Choi (scammer) and Lily Tan (victim)	.mdb, .txt
3	Log of soul application downloaded (platform of performing scamming)	.log

3.3.1 Evidence Class 1 – Deleted Files

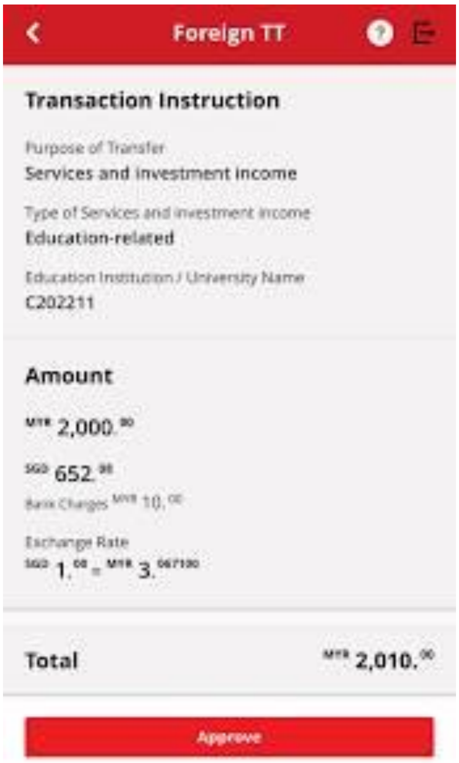
The evidence image shown below is extracted from the location: /img_android.dd/vol_vol31/media/0/Android/data/com.soul.android.international/cache/luban_disk_cache/1682061835944119.jpeg in the autopsy application The account number in the screenshot is believed to be belonging to the suspect account number where he use it to collect fund from victim. The file has been deleted from the suspect phone but have been recovered by our forensic expert. Suspect is believed to be intendedly destroy the potential evidence that can be used to press charge against him.



CIMB Bank – 7628015335

Figure 3.3.1a Possible evidence of suspect bank account

The evidence image shown below is extracted from the location: /img_android.dd/vol_vol31/data/com.google.android.googlequicksearchbox/files/proactive/the-real-index.jpeg in the autopsy application. The screenshot is believed to be the money transaction sent by victim to the suspect as the result of scamming. The file is deleted from the suspect phone but have been recovered by our forensic expert. Suspect is believed to be intendedly destroy the potential evidence that can be used to press charge against him.



Transaction Instruction

Purpose of Transfer
Services and investment income

Type of Services and investment income
Education-related

Education Institution / University Name
C202211

Amount

$^{\text{MYR}}$ 2,000.^{00}

$^{\text{SGD}}$ 652.^{98}

Bank Charges $^{\text{MYR}}$ 10.^{00}

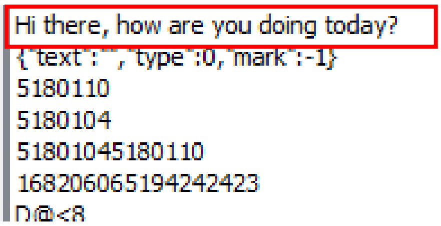
Exchange Rate
$^{\text{SGD}}$ 1.^{00} = $^{\text{MYR}}$ 3.^{067100}

Total $^{\text{MYR}}$ 2,010.^{00}

Figure 3.3.1b Possible evidence of victim money transaction

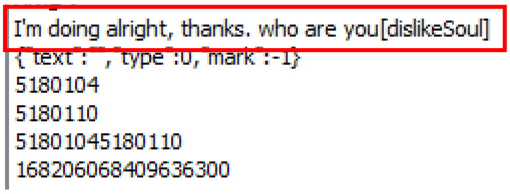
3.3.2 Evidence Class 2- Chat History

The extracted conversation history between Mathew Choi (scammer) and Lily Tan (victim) that is found at the location: /img_android.dd/vol_vol31/data/com.soul.android.international/files/objectbox/5180104db/data.mdb in autopsy program. The record shown below is the original evidence that is in the unprocessed state.



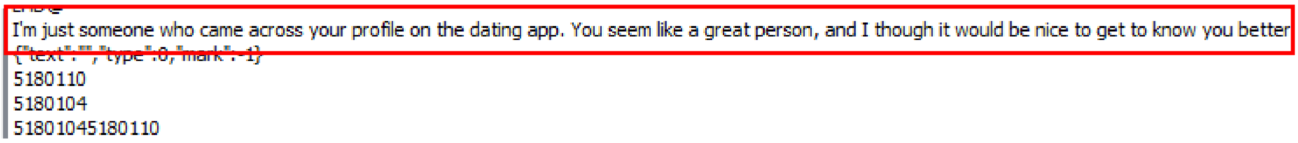
```
Hi there, how are you doing today?
{"text":"","type":0,"mark":-1}
5180110
5180104
51801045180110
1682060651942424 23
D@<8
```

Figure 3.3.2a Autopsy chat-1 send by Mathew



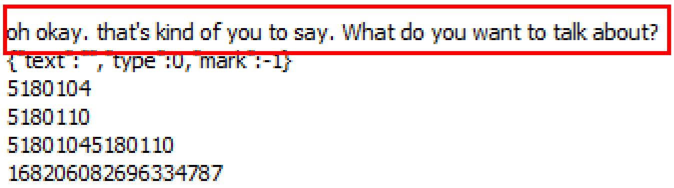
```
I'm doing alright, thanks. who are you[dislikeSoul]
{"text":"","type":0,"mark":-1}
5180104
5180110
51801045180110
1682060684096363 00
```

Figure 3.3.2b Autopsy chat-2 send by Lily



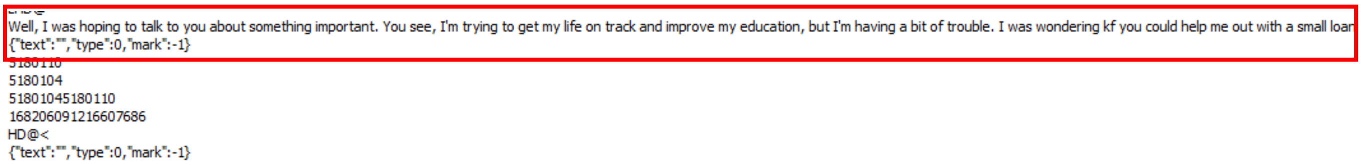
```
I'm just someone who came across your profile on the dating app. You seem like a great person, and I though it would be nice to get to know you better
{"text":"","type":0,"mark":-1}
5180110
5180104
51801045180110
```

Figure 3.3.2c Autopsy chat-3 send by Mathew



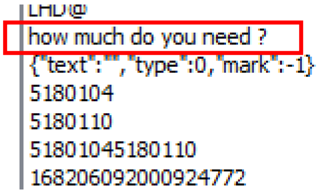
```
oh okay. that's kind of you to say. What do you want to talk about?
{"text":"","type":0,"mark":-1}
5180104
5180110
51801045180110
168206082696334787
```

Figure 3.3.2d Autopsy chat-4 send by Lily



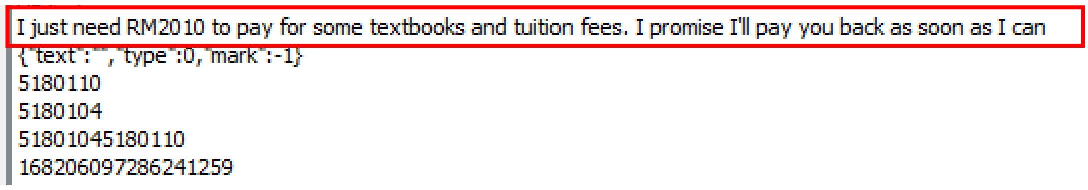
```
Well, I was hoping to talk to you about something important. You see, I'm trying to get my life on track and improve my education, but I'm having a bit of trouble. I was wondering kf you could help me out with a small loan
{"text":"","type":0,"mark":-1}
5180110
5180104
51801045180110
168206091216607686
HD@<
{"text":"","type":0,"mark":-1}
```

Figure 3.3.2e Autopsy chat-5 send by Mathew



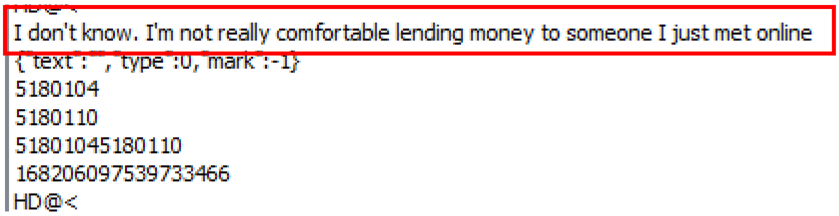
```
LHD@
how much do you need ?
{"text":"","type":0,"mark":-1}
5180104
5180110
51801045180110
168206092000924772
```

Figure 3.3.2f Autopsy chat-6 send by Lily



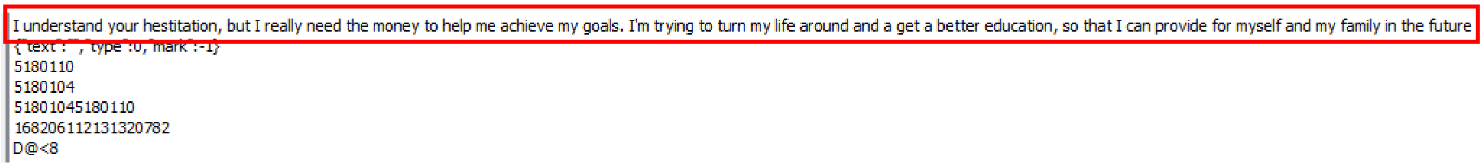
```
I just need RM2010 to pay for some textbooks and tuition fees. I promise I'll pay you back as soon as I can
{"text":"","type":0,"mark":-1}
5180110
5180104
51801045180110
168206097286241259
```

Figure 3.3.2g Autopsy chat-7 send by Mathew



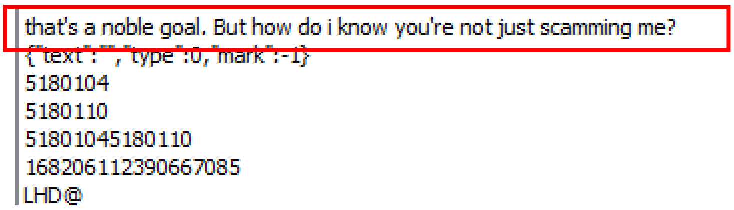
```
I don't know. I'm not really comfortable lending money to someone I just met online
{"text":"","type":0,"mark":-1}
5180104
5180110
51801045180110
168206097539733466
HD@<
```

Figure 3.3.2h Autopsy chat-8 send by Lily



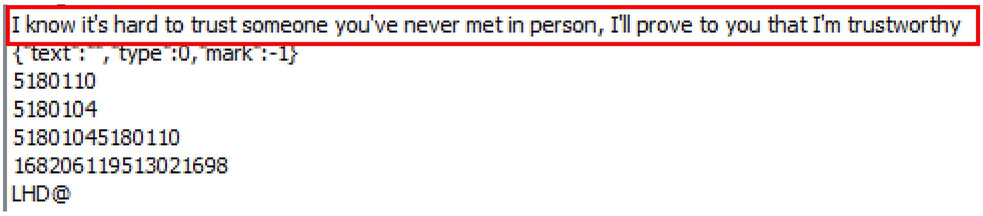
```
I understand your hestitation, but I really need the money to help me achieve my goals. I'm trying to turn my life around and a get a better education, so that I can provide for myself and my family in the future
{"text":"","type":0,"mark":-1}
5180110
5180104
51801045180110
168206112131320782
D@<8
```

Figure 3.3.2i Autopsy chat-9 send by Mathew



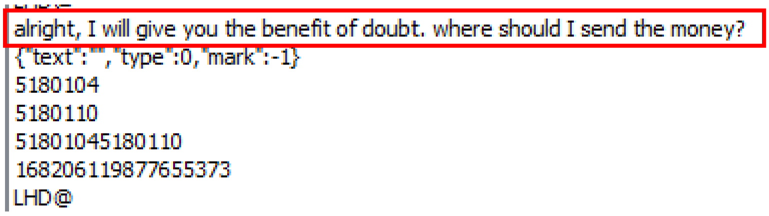
```
that's a noble goal. But how do i know you're not just scamming me?
{"text":"","type":0,"mark":-1}
5180104
5180110
51801045180110
168206112390667085
LHD@
```

Figure 3.3.2j Autopsy chat-10 send by Lily



```
I know it's hard to trust someone you've never met in person, I'll prove to you that I'm trustworthy
{"text":"","type":0,"mark":-1}
5180110
5180104
51801045180110
168206119513021698
LHD@
```

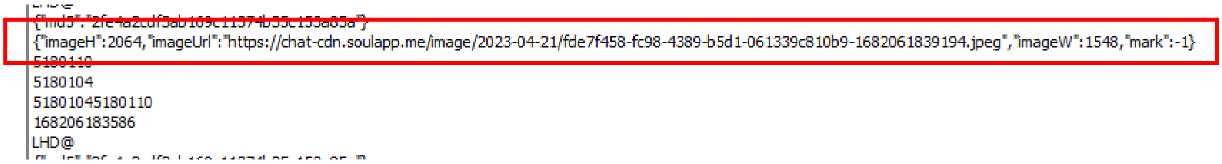
Figure 3.3.2k Autopsy chat-11 send by Mathew



```
alright, I will give you the benefit of doubt. where should I send the money?
{"text":"","type":0,"mark":-1}
5180104
5180110
51801045180110
168206119877655373
LHD@
```

Figure 3.3.2l Autopsy chat-12 send by Lily

https://chat-cdn.soulapp.me/image/2023-04-21/fde7f458-fc98-4389-b5d1-061339c810b9-1682061839194.jpeg



```
{"md5":"2fe4a2cdf3ab109c11374b35c153a85a"}
{"imageH":2064,"imageUrl":"https://chat-cdn.soulapp.me/image/2023-04-21/fde7f458-fc98-4389-b5d1-061339c810b9-1682061839194.jpeg","imageW":1548,"mark":-1}
5180110
5180104
51801045180110
168206183586
LHD@
```

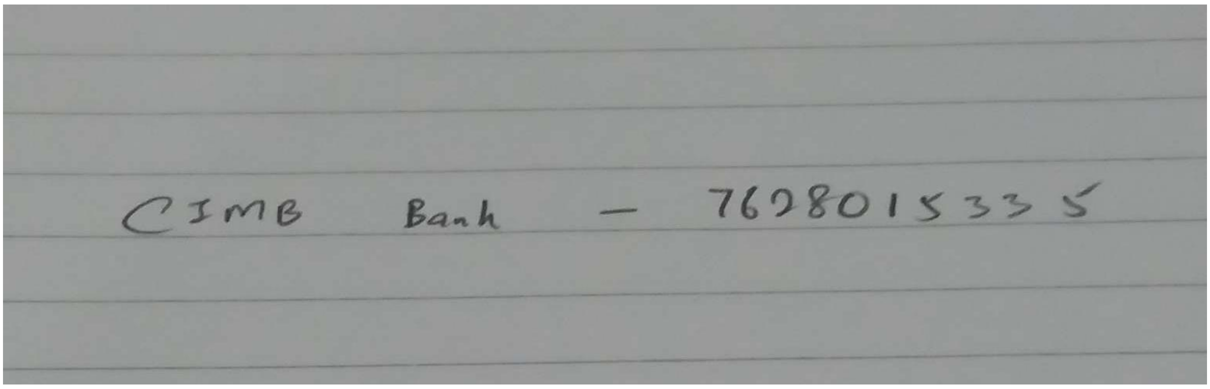
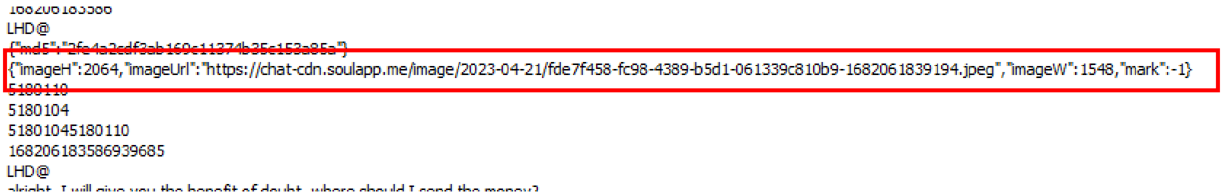
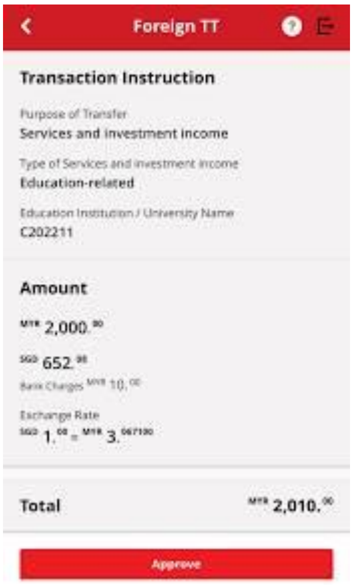


Figure 3.3.2m Autopsy chat-13 send by Mathew

https://chat-cdn.soulapp.me/image/2023-04-21/70b26961-1621-4c2e-9f5c-89a06cbdcb0a-1682061865172.jpeg



```
1682061835586
LHD@
{"md5":"2fe4a2cdf3ab169c11374b35c153a85a"}
{"imageH":2064,"imageUrl":"https://chat-cdn.soulapp.me/image/2023-04-21/fde7f458-fc98-4389-b5d1-061339c810b9-1682061839194.jpeg","imageW":1548,"mark":-1}
5180110
5180104
51801045180110
168206183586939685
LHD@
alright. I will give you the benefit of doubt, where should I send the money?
```



Transaction Instruction

Purpose of Transfer
Services and investment income

Type of Services and investment income
Education-related

Education Institution / University Name
C202211

Amount

MYR 2,000.00

SGD 652.98

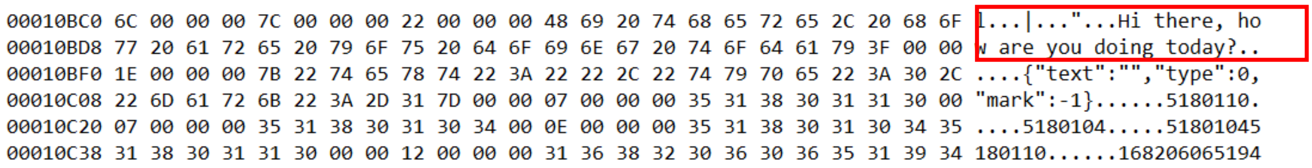
Bank Charges MYR 10.00

Exchange Rate
SGD 1.00 = MYR 3.067100

Total MYR 2,010.00

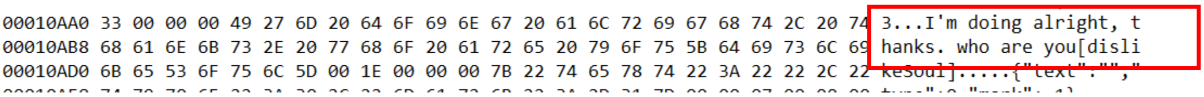
Figure 3.3.2n Autopsy chat-14 send by Lily

Due to the proprietary nature of the evidence file data, our forensic analyst has exported this chat history to hex workshop and perform future analysis from there. In the extracted conversation below, we can conclude that Ms Lily Tan has fall into trap of Mr Mathew Choi and transfer the money to him.



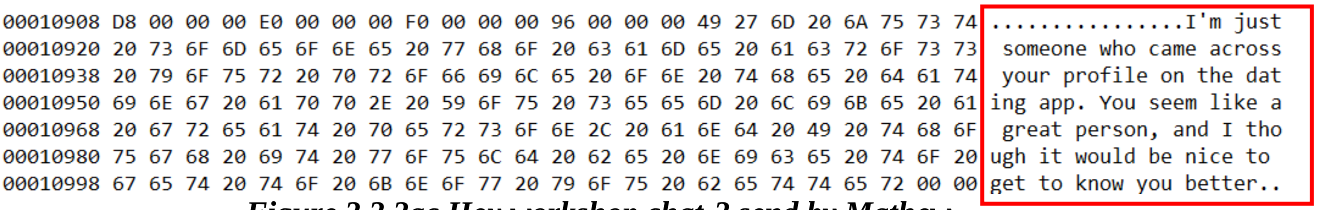
```
00010BC0 6C 00 00 00 7C 00 00 00 22 00 00 00 48 69 20 74 68 65 72 65 2C 20 68 6F l...|..."...Hi there, ho
00010BD8 77 20 61 72 65 20 79 6F 75 20 64 6F 69 6E 67 20 74 6F 64 61 79 3F 00 00 w are you doing today?..
00010BF0 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 74 79 70 65 22 3A 30 2C ....{"text":"","type":0,
00010C08 22 6D 61 72 6B 22 3A 2D 31 7D 00 00 07 00 00 00 35 31 38 30 31 31 30 00 "mark":-1}......5180110.
00010C20 07 00 00 00 35 31 38 30 31 30 34 00 0E 00 00 00 35 31 38 30 31 30 34 35 ....5180104.....51801045
00010C38 31 38 30 31 31 30 00 00 12 00 00 00 31 36 38 32 30 36 30 36 35 31 39 34 180110......168206065194
```

Figure 3.3.2aa Hex workshop chat-1 send by Mathew



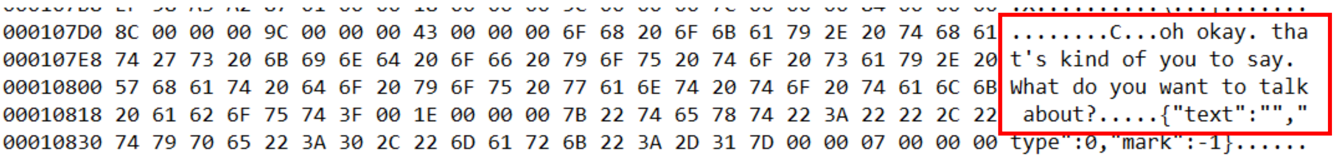
```
00010AA0 33 00 00 00 49 27 6D 20 64 6F 69 6E 67 20 61 6C 72 69 67 68 74 2C 20 74 3...I'm doing alright, t
00010AB8 68 61 6E 6B 73 2E 20 77 68 6F 20 61 72 65 20 79 6F 75 5B 64 69 73 6C 69 hanks. who are you[disli
00010AD0 6B 65 53 6F 75 6C 5D 00 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 keSoul].....{"text":"","
```

Figure 3.3.2ab Hex workshop chat-2 send by Lily



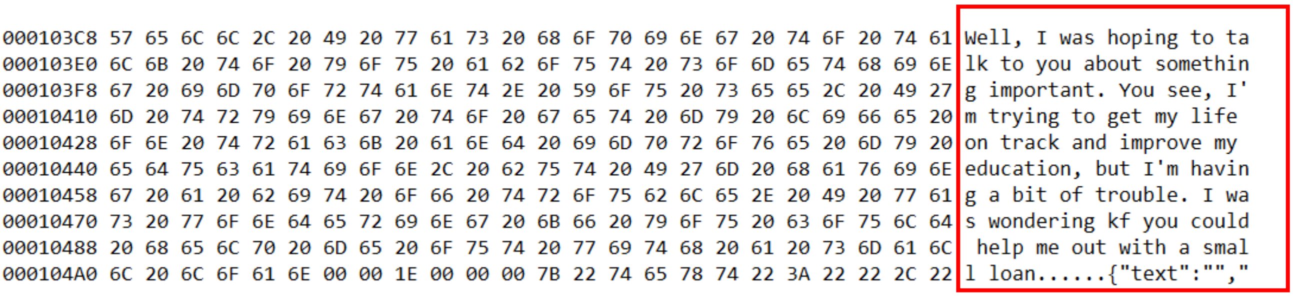
```
00010908 D8 00 00 00 E0 00 00 00 F0 00 00 00 96 00 00 00 49 27 6D 20 6A 75 73 74 ................I'm just
00010920 20 73 6F 6D 65 6F 6E 65 20 77 68 6F 20 63 61 6D 65 20 61 63 72 6F 73 73  someone who came across
00010938 20 79 6F 75 72 20 70 72 6F 66 69 6C 65 20 6F 6E 20 74 68 65 20 64 61 74  your profile on the dat
00010950 69 6E 67 20 61 70 70 2E 20 59 6F 75 20 73 65 65 6D 20 6C 69 6B 65 20 61 ing app. You seem like a
00010968 20 67 72 65 61 74 20 70 65 72 73 6F 6E 2C 20 61 6E 64 20 49 20 74 68 6F  great person, and I tho
00010980 75 67 68 20 69 74 20 77 6F 75 6C 64 20 62 65 20 6E 69 63 65 20 74 6F 20 ugh it would be nice to
00010998 67 65 74 20 74 6F 20 6B 6E 6F 77 20 79 6F 75 20 62 65 74 74 65 72 00 00 get to know you better..
```

Figure 3.3.2ac Hex workshop chat-3 send by Mathew



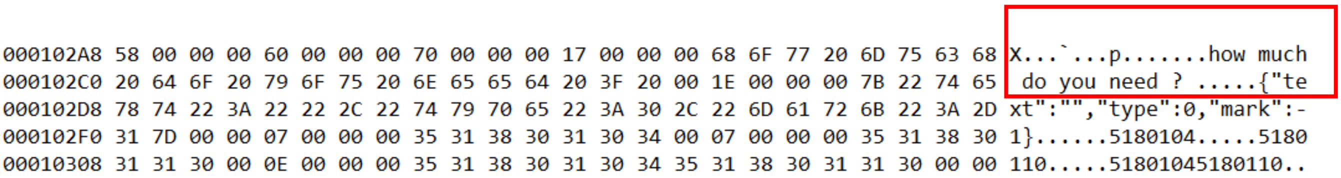
```
000107D0 8C 00 00 00 9C 00 00 00 43 00 00 00 6F 68 20 6F 6B 61 79 2E 20 74 68 61 ........C...oh okay. tha
000107E8 74 27 73 20 6B 69 6E 64 20 6F 66 20 79 6F 75 20 74 6F 20 73 61 79 2E 20 t's kind of you to say. 
00010800 57 68 61 74 20 64 6F 20 79 6F 75 20 77 61 6E 74 20 74 6F 20 74 61 6C 6B What do you want to talk
00010818 20 61 62 6F 75 74 3F 00 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22  about?.....{"text":"","
00010830 74 79 70 65 22 3A 30 2C 22 6D 61 72 6B 22 3A 2D 31 7D 00 00 07 00 00 00 type":0,"mark":-1}......
```

Figure 3.3.2ad Hex workshop chat-4 send by Lily



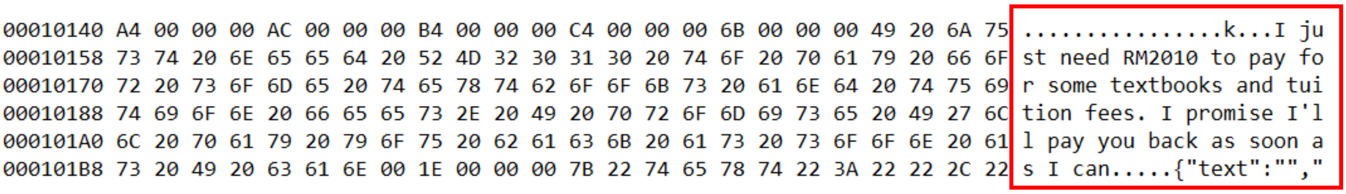
```
000103C8 57 65 6C 6C 2C 20 49 20 77 61 73 20 68 6F 70 69 6E 67 20 74 6F 20 74 61 Well, I was hoping to ta
000103E0 6C 6B 20 74 6F 20 79 6F 75 20 61 62 6F 75 74 20 73 6F 6D 65 74 68 69 6E lk to you about somethin
000103F8 67 20 69 6D 70 6F 72 74 61 6E 74 2E 20 59 6F 75 20 73 65 65 2C 20 49 27 g important. You see, I'
00010410 6D 20 74 72 79 69 6E 67 20 74 6F 20 67 65 74 20 6D 79 20 6C 69 66 65 20 m trying to get my life 
00010428 6F 6E 20 74 72 61 63 6B 20 61 6E 64 20 69 6D 70 72 6F 76 65 20 6D 79 20 on track and improve my 
00010440 65 64 75 63 61 74 69 6F 6E 2C 20 62 75 74 20 49 27 6D 20 68 61 76 69 6E education, but I'm havin
00010458 67 20 61 20 62 69 74 20 6F 66 20 74 72 6F 75 62 6C 65 2E 20 49 20 77 61 g a bit of trouble. I wa
00010470 73 20 77 6F 6E 64 65 72 69 6E 67 20 6B 66 20 79 6F 75 20 63 6F 75 6C 64 s wondering kf you could
00010488 20 68 65 6C 70 20 6D 65 20 6F 75 74 20 77 69 74 68 20 61 20 73 6D 61 6C  help me out with a smal
000104A0 6C 20 6C 6F 61 6E 00 00 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 l loan......{"text":"","
```

Figure 3.3.2ae Hex workshop chat-5 send by Mathew



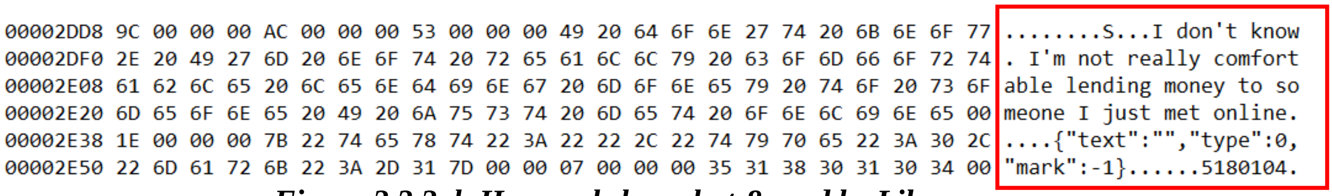
```
000102A8 58 00 00 00 60 00 00 00 70 00 00 00 17 00 00 00 68 6F 77 20 6D 75 63 68 X...`...p.......how much
000102C0 20 64 6F 20 79 6F 75 20 6E 65 65 64 20 3F 20 00 1E 00 00 00 7B 22 74 65  do you need ? .....{"te
000102D8 78 74 22 3A 22 22 2C 22 74 79 70 65 22 3A 30 2C 22 6D 61 72 6B 22 3A 2D xt":"","type":0,"mark":-
000102F0 31 7D 00 00 07 00 00 00 35 31 38 30 31 30 34 00 07 00 00 00 35 31 38 30 1}......5180104.....5180
00010308 31 31 30 00 0E 00 00 00 35 31 38 30 31 30 34 35 31 38 30 31 31 30 00 00 110.....51801045180110..
```

Figure 3.3.2af Hex workshop chat-6 send by Lily



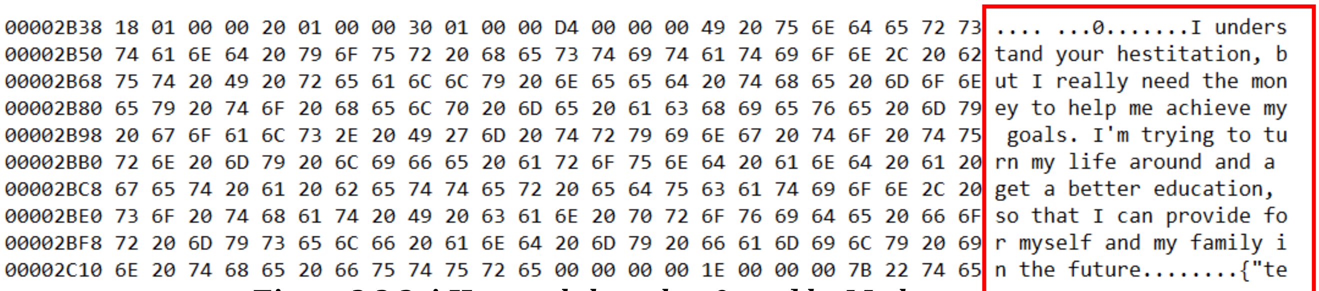
```
00010140 A4 00 00 00 AC 00 00 00 B4 00 00 00 C4 00 00 00 6B 00 00 00 49 20 6A 75 ................k...I ju
00010158 73 74 20 6E 65 65 64 20 52 4D 32 30 31 30 20 74 6F 20 70 61 79 20 66 6F st need RM2010 to pay fo
00010170 72 20 73 6F 6D 65 20 74 65 78 74 62 6F 6F 6B 73 20 61 6E 64 20 74 75 69 r some textbooks and tui
00010188 74 69 6F 6E 20 66 65 65 73 2E 20 49 20 70 72 6F 6D 69 73 65 20 49 27 6C tion fees. I promise I'l
000101A0 6C 20 70 61 79 20 79 6F 75 20 62 61 63 6B 20 61 73 20 73 6F 6F 6E 20 61 l pay you back as soon a
000101B8 73 20 49 20 63 61 6E 00 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 s I can.....{"text":"","
```

Figure 3.3.2ag Hex workshop chat-7 send by Mathew



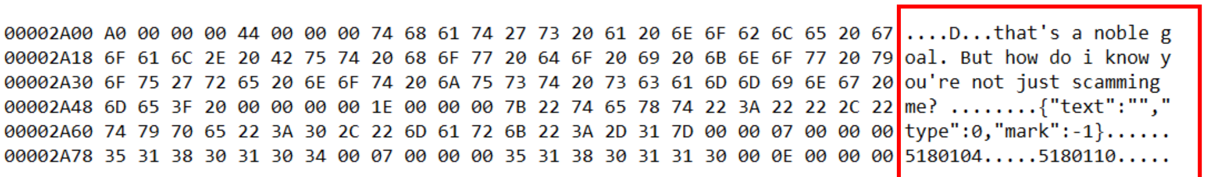
```
00002DD8 9C 00 00 00 AC 00 00 00 53 00 00 00 49 20 64 6F 6E 27 74 20 6B 6E 6F 77 ........S...I don't know
00002DF0 2E 20 49 27 6D 20 6E 6F 74 20 72 65 61 6C 6C 79 20 63 6F 6D 66 6F 72 74 . I'm not really comfort
00002E08 61 62 6C 65 20 6C 65 6E 64 69 6E 67 20 6D 6F 6E 65 79 20 74 6F 20 73 6F able lending money to so
00002E20 6D 65 6F 6E 65 20 49 20 6A 75 73 74 20 6D 65 74 20 6F 6E 6C 69 6E 65 00 meone I just met online.
00002E38 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 74 79 70 65 22 3A 30 2C ....{"text":"","type":0,
00002E50 22 6D 61 72 6B 22 3A 2D 31 7D 00 00 07 00 00 00 35 31 38 30 31 30 34 00 "mark":-1}......5180104.
```

Figure 3.3.2ah Hex workshop chat-8 send by Lily



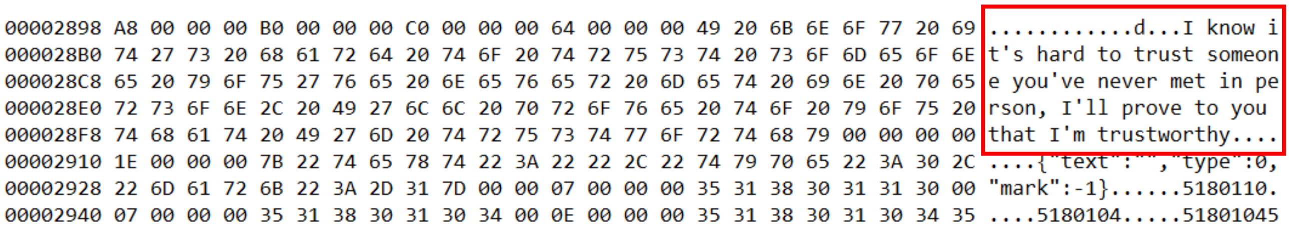
```
00002B38 18 01 00 00 20 01 00 00 30 01 00 00 D4 00 00 00 49 20 75 6E 64 65 72 73 .... ...0.......I unders
00002B50 74 61 6E 64 20 79 6F 75 72 20 68 65 73 74 69 74 61 74 69 6F 6E 2C 20 62 tand your hestitation, b
00002B68 75 74 20 49 20 72 65 61 6C 6C 79 20 6E 65 65 64 20 74 68 65 20 6D 6F 6E ut I really need the mon
00002B80 65 79 20 74 6F 20 68 65 6C 70 20 6D 65 20 61 63 68 69 65 76 65 20 6D 79 ey to help me achieve my
00002B98 20 67 6F 61 6C 73 2E 20 49 27 6D 20 74 72 79 69 6E 67 20 74 6F 20 74 75  goals. I'm trying to tu
00002BB0 72 6E 20 6D 79 20 6C 69 66 65 20 61 72 6F 75 6E 64 20 61 6E 64 20 61 20 rn my life around and a 
00002BC8 67 65 74 20 61 20 62 65 74 74 65 72 20 65 64 75 63 61 74 69 6F 6E 2C 20 get a better education, 
00002BE0 73 6F 20 74 68 61 74 20 49 20 63 61 6E 20 70 72 6F 76 69 64 65 20 66 6F so that I can provide fo
00002BF8 72 20 6D 79 73 65 6C 66 20 61 6E 64 20 6D 79 20 66 61 6D 69 6C 79 20 69 r myself and my family i
00002C10 6E 20 74 68 65 20 66 75 74 75 72 65 00 00 00 00 1E 00 00 00 7B 22 74 65 n the future........{"te
```

Figure 3.3.2ai Hex workshop chat-9 send by Mathew



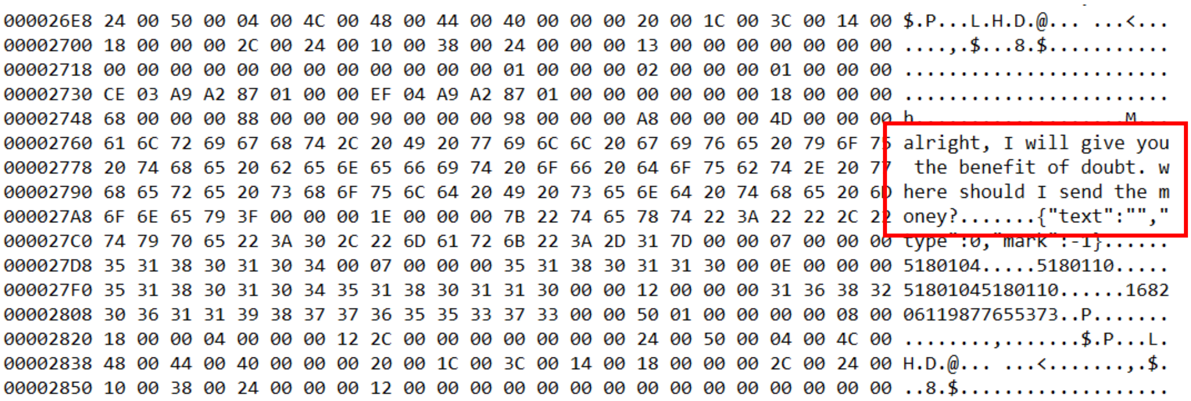
```
00002A00 A0 00 00 00 44 00 00 00 74 68 61 74 27 73 20 61 20 6E 6F 62 6C 65 20 67 ....D...that's a noble g
00002A18 6F 61 6C 2E 20 42 75 74 20 68 6F 77 20 64 6F 20 69 20 6B 6E 6F 77 20 79 oal. But how do i know y
00002A30 6F 75 27 72 65 20 6E 6F 74 20 6A 75 73 74 20 73 63 61 6D 6D 69 6E 67 20 ou're not just scamming 
00002A48 6D 65 3F 20 00 00 00 00 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 me? ........{"text":"","
00002A60 74 79 70 65 22 3A 30 2C 22 6D 61 72 6B 22 3A 2D 31 7D 00 00 07 00 00 00 type":0,"mark":-1}......
00002A78 35 31 38 30 31 30 34 00 07 00 00 00 35 31 38 30 31 31 30 00 0E 00 00 00 5180104.....5180110.....
```

Figure 3.3.2aj Hex workshop chat-10 send by Lily



```
00002898 A8 00 00 00 B0 00 00 00 C0 00 00 00 64 00 00 00 49 20 6B 6E 6F 77 20 69 ............d...I know i
000028B0 74 27 73 20 68 61 72 64 20 74 6F 20 74 72 75 73 74 20 73 6F 6D 65 6F 6E t's hard to trust someon
000028C8 65 20 79 6F 75 27 76 65 20 6E 65 76 65 72 20 6D 65 74 20 69 6E 20 70 65 e you've never met in pe
000028E0 72 73 6F 6E 2C 20 49 27 6C 6C 20 70 72 6F 76 65 20 74 6F 20 79 6F 75 20 rson, I'll prove to you 
000028F8 74 68 61 74 20 49 27 6D 20 74 72 75 73 74 77 6F 72 74 68 79 00 00 00 00 that I'm trustworthy....
00002910 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 74 79 70 65 22 3A 30 2C ....{"text":"","type":0,
00002928 22 6D 61 72 6B 22 3A 2D 31 7D 00 00 07 00 00 00 35 31 38 30 31 31 30 00 "mark":-1}......5180110.
00002940 07 00 00 00 35 31 38 30 31 30 34 00 0E 00 00 00 35 31 38 30 31 30 34 35 ....5180104.....51801045
```

Figure 3.3.2ak Hex workshop chat-11 send by Mathew

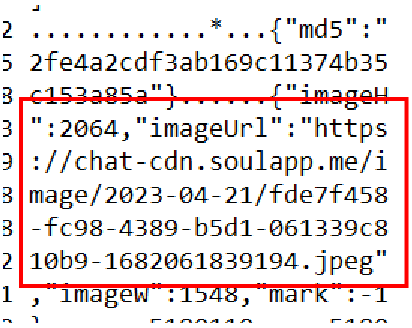


```
000026E8 24 00 50 00 04 00 4C 00 48 00 44 00 40 00 00 00 20 00 1C 00 3C 00 14 00 $.P...L.H.D.@... ...<...
00002700 18 00 00 00 2C 00 24 00 10 00 38 00 24 00 00 00 13 00 00 00 00 00 00 00 ....,.$...8.$...........
00002718 00 00 00 00 00 00 00 00 00 00 00 00 01 00 00 00 02 00 00 00 01 00 00 00 ........................
00002730 CE 03 A9 A2 87 01 00 00 EF 04 A9 A2 87 01 00 00 00 00 00 00 18 00 00 00 ........................
00002748 68 00 00 00 88 00 00 00 90 00 00 00 98 00 00 00 A8 00 00 00 4D 00 00 00 h...................M...
00002760 61 6C 72 69 67 68 74 2C 20 49 20 77 69 6C 6C 20 67 69 76 65 20 79 6F 75 alright, I will give you
00002778 20 74 68 65 20 62 65 6E 65 66 69 74 20 6F 66 20 64 6F 75 62 74 2E 20 77  the benefit of doubt. w
00002790 68 65 72 65 20 73 68 6F 75 6C 64 20 49 20 73 65 6E 64 20 74 68 65 20 6D here should I send the m
000027A8 6F 6E 65 79 3F 00 00 00 1E 00 00 00 7B 22 74 65 78 74 22 3A 22 22 2C 22 oney?.......{"text":"","
000027C0 74 79 70 65 22 3A 30 2C 22 6D 61 72 6B 22 3A 2D 31 7D 00 00 07 00 00 00 type":0,"mark":-1}......
000027D8 35 31 38 30 31 30 34 00 07 00 00 00 35 31 38 30 31 31 30 00 0E 00 00 00 5180104.....5180110.....
000027F0 35 31 38 30 31 30 34 35 31 38 30 31 31 30 00 00 12 00 00 00 31 36 38 32 51801045180110......1682
00002808 30 36 31 31 39 38 37 37 36 35 35 33 37 33 00 00 50 01 00 00 00 00 08 00 06119877655373..P.......
00002820 18 00 00 04 00 00 00 12 2C 00 00 00 00 00 00 00 24 00 50 00 04 00 4C 00 ........,.......$.P...L.
00002838 48 00 44 00 40 00 00 00 20 00 1C 00 3C 00 14 00 18 00 00 00 2C 00 24 00 H.D.@... ...<.......,.$.
00002850 10 00 38 00 24 00 00 00 12 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ..8.$...................
```

Figure 3.3.2al Hex workshop chat-12 send by Lily

Evidence image included in the chat history where the suspect sends the bank information to the victim

https://chat-cdn.soulapp.me/image/2023-04-21/fde7f458-fc98-4389-b5d1-061339c810b9-1682061839194.jpeg



```
2 ............*...{"md5":"
5 2fe4a2cdf3ab169c11374b35
3 c153a85a"}......{"imageH
3 ":2064,"imageUrl":"https
9 ://chat-cdn.soulapp.me/i
3 mage/2023-04-21/fde7f458
3 -fc98-4389-b5d1-061339c8
2 10b9-1682061839194.jpeg"
1 ,"imageW":1548,"mark":-1
```

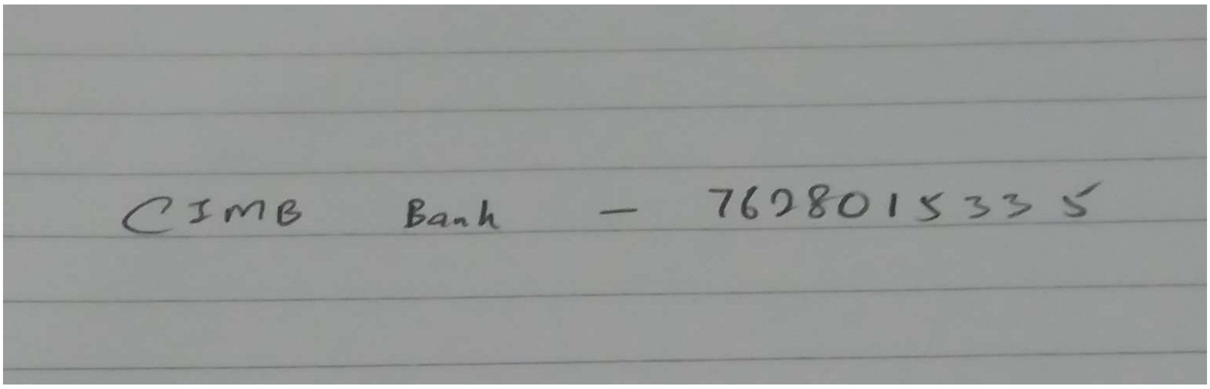
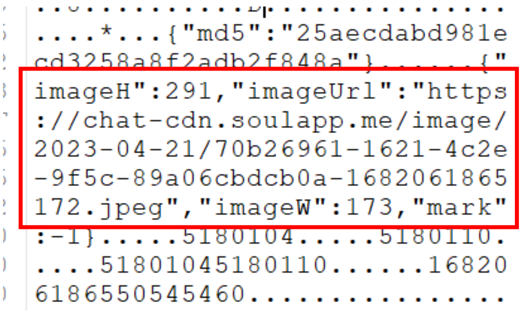


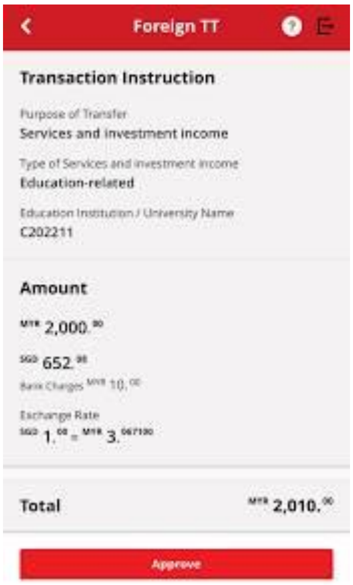
Figure 3.3.2am Hex workshop chat-13 send by Mathew

Evidence image included in the chat history where the victim sends the money transaction screenshot to the suspects

https://chat-cdn.soulapp.me/image/2023-04-21/70b26961-1621-4c2e-9f5c-89a06cbdcb0a-1682061865172.jpeg



```
..0...........Dp..............
....*...{"md5":"25aecdabd981e
cd3258a8f2adb2f848a"}......{"
imageH":291,"imageUrl":"https
://chat-cdn.soulapp.me/image/
2023-04-21/70b26961-1621-4c2e
-9f5c-89a06cbdcb0a-1682061865
172.jpeg","imageW":173,"mark"
:-1}.....5180104.....5180110.
....51801045180110......16820
6186550545460...............
```



Transaction Instruction

Purpose of Transfer
Services and investment income

Type of Services and investment income
Education-related

Education Institution / University Name
C202211

Amount

MYR 2,000.00

SGD 652.98

Bank Charges MYR 10.00

Exchange Rate
SGD 1.00 = MYR 3.067100

Total MYR 2,010.00

Figure 3.3.2an Hex workshop chat-14 send by Lily

3.3.1 Evidence Class 3 – Log of "Soul" program

The evidence below is extracted from the location: /img_android.dd/vol_vol31/data/com.google.android.gm/cache/cronet_cache/disk_cache/000008.log in the autopsy forensic analysis tools. The code snippet below is the extracted information from the suspect phone log as a prove that he has downloads the Soul application to perform scamming.

```
{"version_name":"2.63.0","install_uuid":"a540f3194cda42939a7e188a80704eaa","version_code":"230418000","delivery_mechanism":4,"development_platform":"Flutter","development_platform_version":"","app_identifier":"com.soul.android.international"}
```

The apk file found at the location:
/img_android.dd/vol_vol31/app/com.soul.android.international-1/com.soul.android.international.apk
further prove the authenticity of this log message

PART 4: CONCLUSIONS

The investigation conducted on the mobile phone seized from Mr. Mathew Choi has yielded significant evidence to support the prosecution's case against him for engaging in fraudulent activities targeting vulnerable individuals on dating apps. Despite the absence of additional information, the thorough examination of the phone's contents has provided valuable insights into Mr. Choi's modus operandi and the potential impact on his victims.

Numerous digital artifacts, including files, emails, social media accounts, and chat histories, were meticulously analysed to establish a pattern of fraudulent behaviours. Although some files had been deleted, their presence in digital remnants further reinforces the case against Mr. Choi. The recovered evidence includes conversations, financial transactions, and personal information that link Mr. Choi to the fraudulent activities and confirm his intent to extort money from unsuspecting individuals.

Throughout the investigation, the forensic team adhered to formal procedures, maintaining the chain of custody to preserve the integrity of the evidence. The utilization of state-of-the-art forensic tools and the expertise of the team members contributed to a comprehensive analysis of the seized phone. The investigation spanned a specific timeframe, ensuring a meticulous examination of all available data.

By categorizing and documenting the recovered files, including their locations and storage areas, the prosecution can present a compelling case against Mr. Choi. The evidence gathered establishes a clear connection between him and the victims, shedding light on the magnitude of his fraudulent activities and the financial harm inflicted upon the victims.

The findings of this investigation, supported by detailed screenshots of the analysis process, provide an extensive overview of the evidence recovered from Mr. Choi's mobile phone. This comprehensive report serves as a valuable resource for the prosecution, enabling them to build a strong case and pursue justice against Mr. Choi for his fraudulent actions.

It is crucial to note that the conclusions drawn from the investigation are based solely on the evidence found on the seized phone. Additional investigations or evidence may be required to strengthen the case further. However, the evidence gathered this far provides a solid foundation for prosecuting Mr. Choi for his fraudulent activities on dating apps, targeting vulnerable individuals and extorting money from them.