Course: 113-1 Embedded System Answer Sheet

Assignment 7: Process & Security

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| **Practice 1: Source code (Please DO NOT provide a screenshot)** |
| #include <stdio.h>  #include <stdlib.h>  #include <unistd.h>  #include <sys/types.h>  #include <sys/wait.h>  int main() {  pid\_t pid;  int status;  *// Integer array for computations*  int arr[] = {1, 2, 3, 4, 5, 6};  int n = sizeof(arr) / sizeof(arr[0]);  pid = fork(); *// Create a child process*  if (pid < 0) {  *// Error handling*  fprintf(stderr, "Fork failed.\n");  return 1;  } else if (pid == 0) {  *// Child process*  int sum = 0;  for (int i = 0; i < n; i++) {  sum += arr[i];  }  printf("This is the child process. Computed sum: %d\n", sum);  exit(0); *// Ensure the child process exits*  } else {  *// Parent process*  wait(&status); *// Wait for the child process to finish*  int product = 1;  for (int i = 0; i < n; i++) {  product \*= arr[i];  }  printf("This is the parent process. Computed product: %d\n", product);  printf("Child process completed.\n");  }  return 0;  } |

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| **Practice 1: Result screenshot (If the C program wasn’t running in Pi / Debian-based system,**  **0 credit.)** |
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| **Practice 2: Shell script source code to configure UFW to meet the security requirements specified in the assignment document. (DO NOT provide a screenshot)** |
| #!/bin/bash  # Check if the script is run as root  if [ "$EUID" -ne 0 ]; then  echo "Please run as root or use sudo"  exit 1  fi  # Update the system  echo "Updating system packages..."  apt update && apt upgrade -y  # Install UFW if not already installed  echo "Checking if UFW is installed..."  if ! command -v ufw &> /dev/null; then  echo "UFW not found. Installing..."  apt install ufw -y  else  echo "UFW is already installed."  fi  # Enable UFW  echo "Enabling UFW..."  ufw enable  # Set default policies  echo "Configuring default UFW policies..."  ufw default deny incoming  ufw default allow outgoing  # Allow SSH (port 22)  echo "Allowing SSH..."  ufw allow 22/tcp  echo "UFW configuration completed successfully!" |

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| # Allow HTTP (port 80) and HTTPS (port 443) for web servers  echo "Allowing HTTP and HTTPS..."  ufw allow 80/tcp  ufw allow 443/tcp  # Block specific ports (example: blocking port 23 for Telnet)  echo "Blocking Telnet (port 23)..."  ufw deny 23/tcp  # Allow custom application port (e.g., 8080)  echo "Allowing custom application port 8080..."  ufw allow 8080/tcp  # Enable logging for UFW  echo "Enabling UFW logging..."  ufw logging on  # Reload UFW to apply changes  echo "Reloading UFW to apply changes..."  ufw reload  # Display the current UFW status and rules  echo "UFW Status and Rules:"  ufw status verbose |

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| **Practice 2: Screenshots of verifying the effectiveness of the UFW setup using Nmap and external online port-checking services.** |
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