
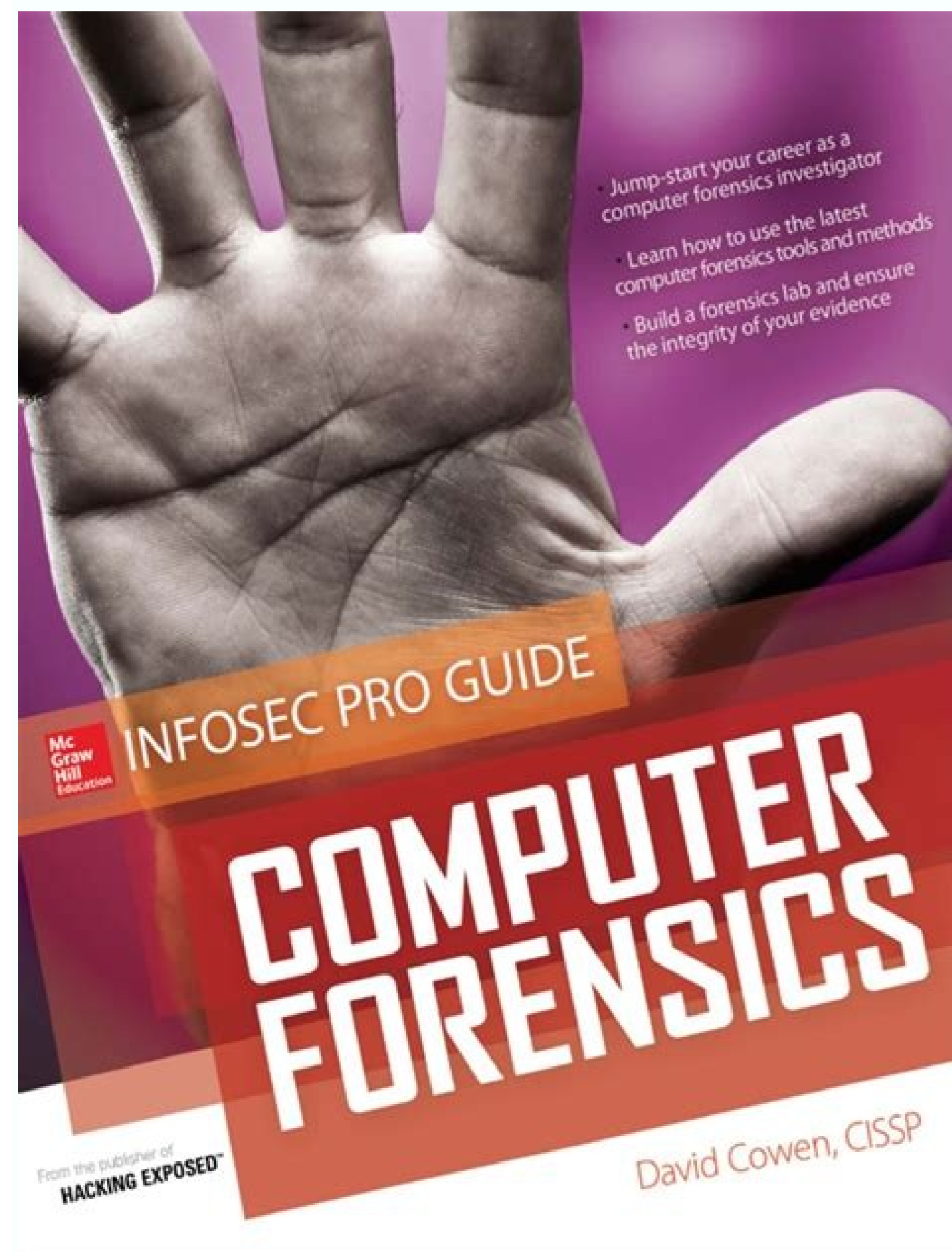


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#### Memory Forensics - References

Papers:

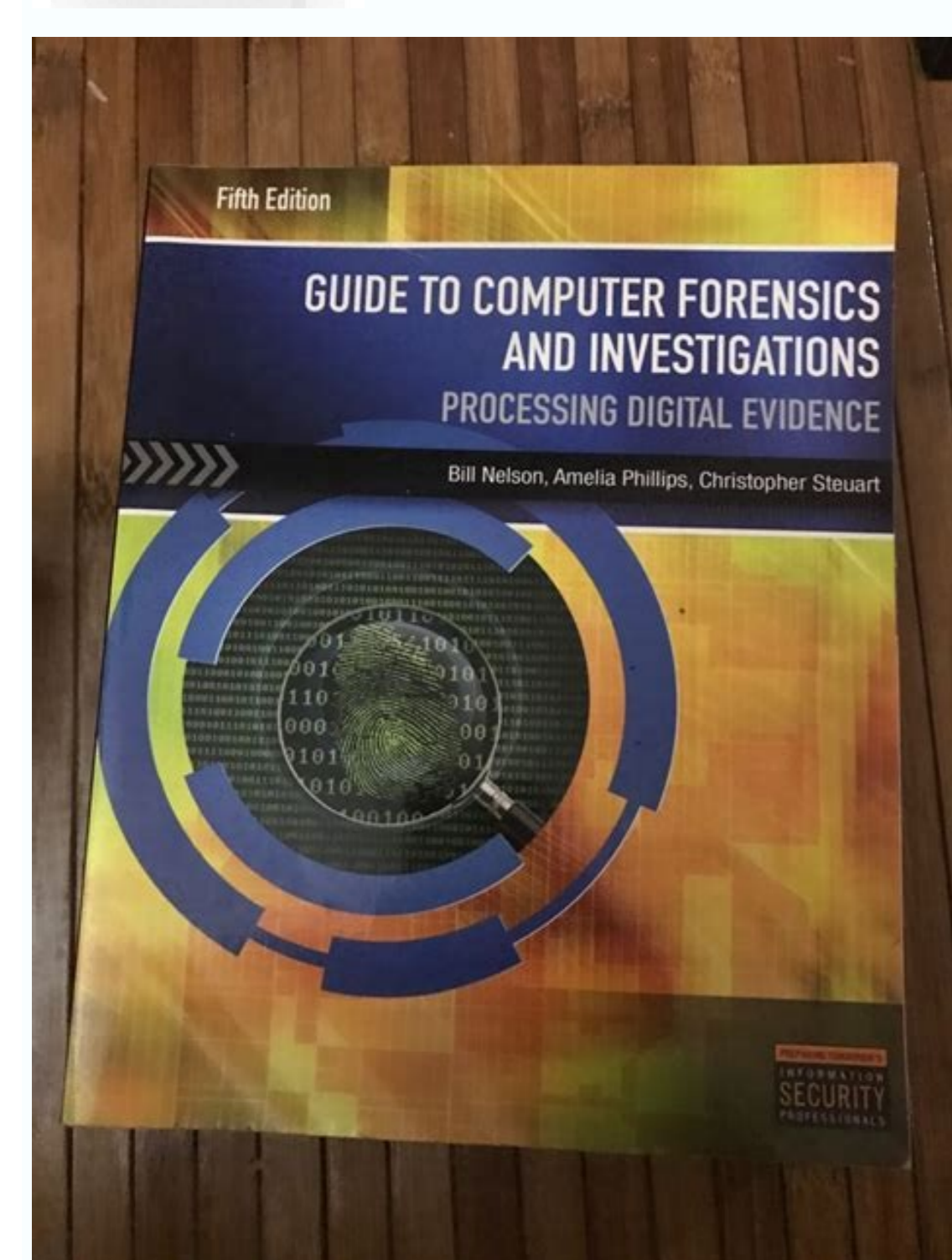
Computer Forensics: Results of Live Response Inquiry vs. Memory Image Analysis  
CERT <https://www.cert.org/infocenter/0808037.pdf> (Cal Wain, Joseph Ayo Akinyele, Richard Nelson, Larry Rogers)

Collecting Evidence from a Running Computer - SEARCH  
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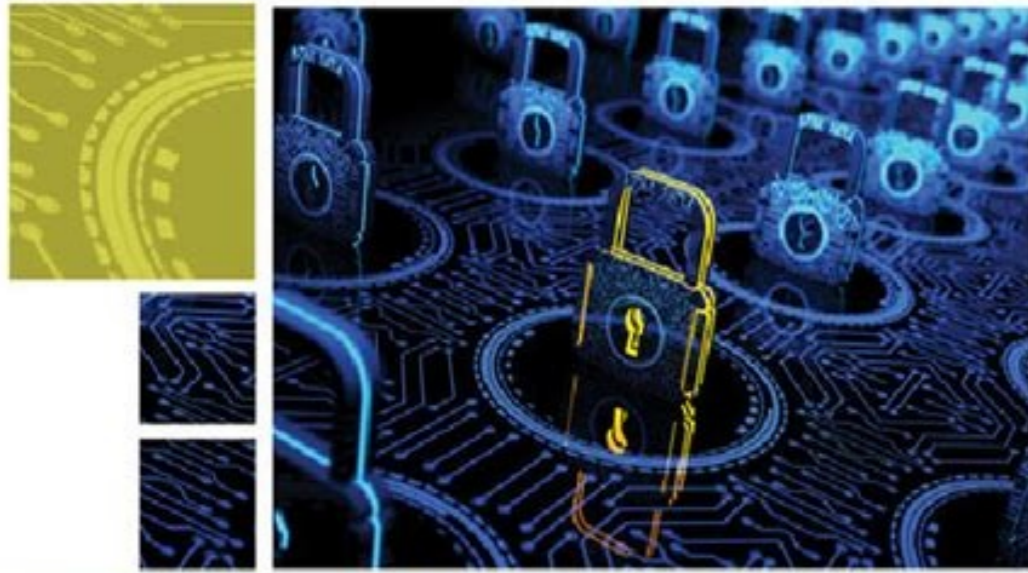
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Electronic Evidence - Guide for First Responders - <http://www.forwardedge2.com/pdf/firstresponders.pdf>





# GUIDE TO COMPUTER FORENSICS AND INVESTIGATIONS



Sixth Edition

Bill Nelson  
Amelia Phillips  
Chris Steuart

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ASCLDeAAA's guidance helps save money by doing upfront work and helping in budget development Guide to Computer Forensics and Investigations, Fifth Edition 3 Identifying Duties of the Lab Manager and Staff Lab manager duties: Set up processes for managing cases Promote group consensus in decision making Maintain fiscal responsibility for lab needs Enforce ethical standards among lab staff members Plan updates for the lab Establish and promote quality-assurance processes Set reasonable production schedules Estimate how many cases an investigator can handle Lab managers typically handle budgets, set goals, and manage resources. :) Guide to Computer Forensics and Investigations, Fifth Edition 14 Conducting High-Risk Investigations High-risk investigations demand more security than the minimum lab requirements TEMPEST facilities Electromagnetic Radiation (EMR) proofed TEMPEST facilities are very expensive You can use low-emanation workstations instead Tempest facilities provide the highest degree of electromagnetic protection eAAA although they are often employed to prevent signal leakage rather than for protection of stored evidence. You should think proactively about disaster recovery. It will also help you to rebuild your workstations in the event of infection or hardware failure. In an episode of the AMC TV show Breaking Bad, the drug dealer parks a truck with a giant magnet next to a wall where he knows evidence is on the other side. Guide to Computer gnitupmnc ni slaitnedrec ezilamrof ot detnaw ohw sreciffo ecilop yb detaerC )SICAI( stsilacepS evitagitsevni retupmoC fo noitaicosaS lanotamretnl tnemyolpme fo aera ruoy ni yllibatpecca dna .Isoc ,stmemirruqer eht hraeser ylhguorohT gniniart etairporppa hguorht sliks ruoy etadpUgniniart dna noitaicifitrec gniriucA 9 noitidE htFIF ,snoitagitsevni dna scisnerof retupmoC ot ediuG ylliferac erawfsof esochs AAAe nur gnol eht ni esol yam uoy Isoc lailini rof emit rekrw ecitrac uoy fl sepyf ro sledom ,sretufatnam fo les a yho ot sretupmoC icrtser yam ynamoc a ecnis ,tnemecroffe wal rof nahf ynamoc a rof noisiorp ot reisaE si ti yllareneG .) steehsdaerps rof lecxE-SM si elpnaxE( skrowten rieht htw desu seced elibom dna sretupmoC fo noitceS eht timil nac yeht ecnis ksat. reisaE na evah netfo seinapmoC sevird ksid hystonicaM dna swodniW htob enimaxe dna CP swodniW a morf krow nac uoy smargorp scisnerof latigid omos htIW metsys gnitariopO morfalp erawdraH htw laed uoy tnemorivne eht yftinedl snoitagitsevni lanretni tudnoc nac sessenisUB onimretot ot ysae era stnemeriucqRsbAL etaroproC dna etavirP rof snoitatskroW gnitceleS 82 noitidE htFIF ,snoitagitsevni dna scisnerof retupmoC ot ediuG stnemtraped ecilop suoirav neowtEb noitarepoc fo eerged hgh a netfo si ereht noitaicol rieht ni dnuof yleklit tsoM emirc retupmoC fo sepyt eht eldnah ot dengise era eseht fo tsoM AAAE sbal scisnerof evah ot stnemtraped ecilop lacol rof lausnu ton si ti noitatskrow cisnerof elibom ,thgiewthgil a etaerc ot ksid drAH ATAS ro ,0.3 BSU ,erlWerIF htw CP potpal a esu won nac uoy snoitatskrow esoprup-lareng ow ro eno dna noitatskrow cisnerof esoprupitlum eno evah thgim tnemtraped ecilop lacol ,llams A ytinummoc eht ni desu sAAAetahw hctam ot erawfsof dna smetsys ycagel deen thgim bal A slot noitagitsevni gnitupmoC rof seeden esrevid tsoM eht evah sbal eciloPbal .a rof snoitatskroW gnitceleS 72 noitidE htFIF ,snoitagitsevni dna Candidates who complete the ICACIS test are designated as a Certified Forensic Computer Examiner (CFCE) Guide to Computer Forensics and Investigations, Fifth Edition 10 Certification and Formation Acquisition Certified Cyber Forensics Professional (CCFP) requires knowledge of digital forensic analysis of malware response to incidents and discovery other disciplines related to cyber investigations There are number of accessories available to receive formation and certification in digital forensic medicine . Guide to Computer Forensics and Investigations, Fifth Edition 11 Certification Acquisition and Training High-Tech Crime Network (HTCN) Certified Computer Crime Investigator, Basic and Advanced Level Certified Computer Forensic Technician, Basic and Advanced Level Encase Certified Examiner (ENCE) CERTIFICATION Open to the Public and Private Sectors for Encase Use and Domain Analysis Candidates are required to have a licensed copy of encase Some certificates are focused on a specific product In the Guide to Forensic Informatics and Investigations, Quinta Edition 12 Determining the physical requirements for a forensic information laboratory Most of your investigation is conducted in a laboratory The laboratory must be safe so that evidence is not lost, corrupted or destroyed to provide a secure and protected physical environment Keep inventory control Know when you ask for more supplies a laborator The modern, well-provisioned and safe forensics is important to avoid challenges are presented evidence. Past expenses, or expenses of a similar forensic unit in another organization, can be used to estimate forensic computation guide and investigations, fifth edition 7 guide for computation The forensics and investigations, fifth edition planning laboratory budget estimates the number of computer cases that your laboratory expects to examine The types of computers you are likely to examine the changes in technology use ,siaredef soir\*Atalar arap semrofinu semirc ed oir\*Atalar od sacitsAtase sa equifireV oEAAide ed oirjAtnemaSro otnemajenalp ed oEAAide atniuc ,sejAAAgitsevni e esnerof oEAAAtupmoC arap aiuG 8 oEAAide otniuc ,sejAAAgitsevni e esnerof rodaturmoC o arap aiuG ,sadaugedani etnemlevissoP asAnaruges uo sejAAaalatni me esab moc sadatneserpa saicn\*Adive a soifased rative arap etnatropmi ©A laicio fo oEAAAcifitrec ed airoitdua ed oir\*Atarobal ed oEAAAcifitrec amu ririurqda oir\*Atarobal mu odnaicnerEG :arap sezirterid ecerofe )DLCSA( serotcerID emirC fo yteicoS nacireM A erawfsof e erawdraH ,otnemapiuge ues ed asaC aicn\*Adive oEAAAgitsevni ed ajol aus zudnoc \*Acov edno ,esnerof oir\*Atarobal ed oEAAAcifitrec ed sotsiuqER so onmednetE 2 orotnaS .M.G ad sianoicida sejAAAmrofini moc megazidnerPA egagneC thgiryropC sedils so sodot rodagitsevni od oir\*Atarobal, e oir\*Atircese O 2 retpahcnnoitidE htFIF sejAAAgitsevni e esnerof RodaturmoC arap aiuG 1 ,ohlabart ues masAAema m©Abmat amile oc sodanoicaler sertsased e ohlabart ed oEAAAtase ed oidn\*Acni ues me erawfsof ed sejAAaazilauta ed axiaf a ahnetnaM serodivres sod oEAAArugiifmoC ed otnemacnerEG diar e socin\*VA socid arap pukcab ed satnemarref iulcni sejAAArugiifnoCec e surAV od oEAAaanimatnoc ,sacif\*Artsatac sejAAaautis ed rarepucer lanigiro oEAAAdnoc aus arap oEAAAgitsevni e ohlabart ed oEAAAtase ed sovniura sues rarutser edop \*Acov euq arugesA oEAAArepuoER ed onalp analp \*ertsased ed oEAAArepuoER ed onalp mu odnasU 13 noitidE htFIF ,sejAAAgitsevni e esnerof rodaturmoC arap aiuG ,salenaj moc ,oirjAsseccen emrofnoc ,ovitacilpa ed erawfsof uo ,sejAAarev e sianoicerepo sarmetis setnerofid ertne ranretla \*Acov ,Araduja oEAAArugiifnoc ed odaugeda otnemacnereG O airjAsseccen a euq od romem etnemariegil edadicapac amu ret euq od airjAsseccen euq od siam etnemariegil edadicapac amu ret rohlem ©A euq sotsuc e oir\*Atarobal ed sotsiuqer sues aicn\*Adectna moc rajenalp arap sejAAAmrofini sasse rasu rerroco a sonesporp siam oEAA rodaturmoC ed semirc ed opit euQ Identify crimes committed with specialized software when creating a laboratory for a private company., hardware inventory problems and software reported last year future developments in computing computation a ,sejAAAgitsevni e esnerof rodaturmoC o arap raiug atartnoc so euq aserpme alep aicn\*Auqerf moc otief ©A ossl - 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depending on the size of your organization and forensics Unit Guide to Forensics and Computer Investigations, Fifth Edition 24 of Digital Forensic Labs mid-Size Labs are typically those in a private company have more workstations must have at least two outputs, for safety or separate office reasons should be part of the layout to reinforce reinforce More Library Space for Software Storage and Hardware Guide for the Forensic Science and Computer Investigations, Fifth Edition 25 Determining Chao Plans for Digital Forensic Laboratories Application of the State Law or The FBI usually performs most large or regional digital forensic laboratories have a separate evidence room one or more custodialiated can be assigned to manage and control the traffic input and exit from the evidence room must have at least two controlled outputs and None Windows Guide to the Forensic Science and Computer Investigations, Fifth Edition 26 Selecting a forensic workstation Buassiddepende from budget and needs Use less powerful workstations for Mundanish tasks Use multipurpose workstations Analysis tasks that consume many features Maintenance tasks include acquisition, hash, copy Analysis tasks include keyword search, decryption etc. Security cameras, recording any activity, can be used for additional protection and to support records. Guide for Survey and Informatics Informatics, Fifth Edition, 16 Using Provided Contains a Combined Locking System is Used: Provide the same safety level for the combination as for the Content of the container € à € œs destroy any previous combination after the configuration of a new combination allow only authorized staff to change the blocking combinations change the combination every six months or when it is necessary to avoid cheap blocks that can be easily separated. Guide for Hardware and Computer Investigations, Fifth Edition 13 Identifying the Security Laboratory Security Needs Should preserve the integrity of the data of evidence requirements Minimum small room with true walls of the cha to the ceiling access to the door with a secure container blocking mechanism dna dna scisnerof retupmoC ot ediuG" ,oEAAIdeA ,6 ,oEAAIdeA ,5 ,snoitagitsevni dna scisnerof retupmoC ot ediuG" sA AeA etnatropmi ©A m©Abmat oEAAAzilacOL asAnaruges ed acitlOp a erbos epuqe aus esivA osseca ed levAn omsem o ret meved satnuj mahlabart euq sosscep sA sAAstnatisiv ed rof snalp raelc htw ,tegdub raelc a hsilbatse ot tatropmi si ti steilec dna sremotusc erufud dna ,neruuc ,suovierp ot scivres sAAeAel eht tekram ot stroffe tatsnoc seruqER dedeen si bal a noscer eht tegdub eht gnillortnoc nosrep eht ot yftisuj ot deen uoy noitaicifitsuj bal scisnerof ruoy rof gniniart dna ,selipus ,sloot ,setilical rof elbaliva si yenom taht crusse ot daeha nalp tsum srotagitsevni bal scisnerof latigid a rof esac ssenisUB a giraperP 53 noitidE htFIF ,snoitagitsevni dna scisnerof retupmoC ot ediuG snalp ssenisUB erufud dna ,sterces edart ,ytreporp lautcelletni tetorP tiusual a fo tsoC htw noitagitsevni na fo tsoC erapmoC sthforp esaercti dna yenom evas ot noitaznagro ruoy pleh liiw bal eht woh etartsnomeD steilic ro tnemeganam ot scivres ruoy les ot esu nac uoy nalP esac ssenisUB smelborp tegdub fo esuacerf melborp a EB NACBAL SCISNEROF A GNIPOLEVED ROF ESAC SSENISUB A GNIDLUB 43 NOITIDE HTFIF ,SNOITAGITSEVNI DNA SCISNEROF RETUPMOC OT EDIUG TrofmoCSID A otni retasid a nrut nac lycnadnuder htw sa hcus( ealpi ni efasliaf a gniVAH ecneirpex evah uoy litnu suoitac erom eb yllaborp dlouhs uoy ,etamitise ot luciffid si ksirI shtnom 21 yreve ylbareferP shtnom 81 yreve tsael ta sedargpu eludehCS snoitidnoc lamron rednu shtnom 63 ot 81 tsal stnenopmoC gnitupmoC sliaf ti newh ecalper nac uoy tnempuqe yftinedl decalper yllaciorep eb nac ti os no sdneped bal ruoy tnempuqe yftinedl noitarepo ro sseccop yna rof elbatpecca si ksir hcuM woh gninimreted sevloni tnemeganam ksirSedargpU tnempuqER rof gninnalp 33 noitidE htFIF ,snoitagitsevni dna scisnerof retupmoC ot ediuG ,sbal denoisivorp dna deffats retteb ot dael liiw stegdub gnipoleved ta lliks AAAE ti ecaF lennosrep gniniartT ecaps ytilicaF erawfsoS erawdraH :edulcni bal a rof sesnepxE stsoc erufud detceppe etalopartxe ot sesnepxe noitagitsevni tsap esU sesnepxe launna dna ,yiretrauq ,yliad otni NWOD STSOC KAERB GNINNALP TEGDUB BALNOITIDE HTFIF HTFIF Evaluation and evaluation, to obtain the funds that you need from management Note that management is often suspicious of the people of IT Security Dÿ™ , considering them as a drainage no -Productive features Some stories of others, similar, organizations security lapses can help, but a clear budget with clear plans makes your case! Guide to Computer Forensics and Investigations, Fifth Edition 36 Preparing Business Case Forensics Lab Development of Budget à € "Needs Including: Cost of Installation Hardware Requirements Software Requirements Software Requirements Approved And acquiring you must present a business case with budget for approval you do not want to ignore any real expense, or areas that, if underfinancing, can compromise your laborator. Guide to Forensic Computation and Investigations, Fifth Edition 39 Preparing a Business Case for a Laboratory Forensic Digital Production After all the essential corrections have been made, the laboratory can enter In production implement laboratory operations procedures Guide for forensic computation and investigations, fifth edition 40 This concludes the lecture for the topic 2.Guide for computation Forensic and investigations, fifth edition periodically. Guide to Computer Forensics and Investigations, Fifth Edition 4 Identifying Duties of the Lab Manager and Stafflab Manager Duties Safe and protected work for the staff and evidence for forensic computation and investigations, fifth edition 5 identifying laboratory manager's duties and hardware and software operations and types of deductive racioanium files Work is regularly reviewed by laboratory manager Check the ASCLD website for manual and online information \*à \*à ragapa arepse ele \*à ,oir\*Atarobal od laer esnerof ohlabart olep levAssnopser etnemlareg ©A esnerof epuqe à € € and is partially successful. In honesty, although the concept is solid, there may be many and many complications, so à €™ count on this. Guide for Army and Informatics Informatics, Fifth Edition 17 Using Provasion Contains You Are Using a Key Padlock: Name a Keeping Key Stamp Sequential Numbers in each Duplicate Key Keep a Registry Listing which key is it assigned to which authorized person to perform a monthly audit make an inventory of all keys put keys in a blockable container Keep the same security for keys as for test contents Change blocks and keys Annually be sure to use keys that can not be legally copied, or very difficult copies keys. Guide for PERABRIC AND INFORMATION INFORMATION, Fifth Edition 15 Using Contains of Evidence as Evidence Armario Should Be Safe For no person not allowed to easily access His evidence Recommendations to protect Storage Contains: Locate them in a limited number of limited personnel of persons authorized to access the container Maintain records on who is authorized to access each container The contesters should remain blocked when they are not in use this helps ensure Chain of custody. Guide for Survey and Informatics Informatics, Quinta Edition 37 Preparation of a Business Case for a Digital Forensic Laboratory Deployment As part of your Business Case, describe how the implementation All approved items will be processed a schedule showing the expected delivery or installation dates and the expected conclusion dates should be included scheduled inspection dates provide details. Not just broad ideas. Guide for Survey and Informatics Informatics, Quinta Edition 32 Using a Disaster Recovery Plan for Laboratorios Using RAID Servers You should consider methods for restoring large datasets Large servers must have adequate data backup systems in the event of a serious failure of more than one drive. Backups and checkpoints are especially important. Only on very much forensic departments will they do acquisition and analysis. Guide to Computer Forensics and Investigations, Fifth Edition 29 Stocking Hardware PeripheralsAny lab should have in stock: IDE cables Ribbon cables for floppy disks Extra USB 3.0 or newer cables and SATA cards SCSI cards, preferably ultrawide Graphics cards, both PCI and AGP types Assorted FireWire and USB adapters Hard disk drives At least two 2.5-inch Notebook IDE hard drives to standard IDE/ATA or SATA adapter Computer hand tools Certain common peripherals and cables should be in ready supply. supply.



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