

Introduction to Database Corruption

WHEN CORRUPTION STRIKES, WILL YOU BE READY?





Introducing our New Customer Account Manager

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Will be screening questions during the session.

If you are a winner in the prize giveaway, she will be contacting you.

Prize Giveaway followed by Questions and Answers We will be **giving away** 3 daily checkup subscriptions:

- 3-month subscription a value of \$300
- 6-month subscription a value of \$600
- 9-month subscription a value of \$900

Q&A after the prize giveaway

Agenda

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Corruption Stories

Causes of corruption

Differences between corruption and ransomware

Preventing / reducing corruption

If you need help



Corruption Stories

Corruption Stories

TWICE FIXED

80+ tables corrupt.

All corruption was in recently updated areas.

Initial repair took about 36 hours.

As we repaired corruption in one table, other tables became corrupt.

Started on Thursday night, done by 6:00pm on Sunday.

Cause of corruptions was a bad switch between the SQL Server and the SAN.

THANKSGIVING

Reported Wednesday of Thanksgiving week. Unknown how long it had been corrupt.

Corruption in system tables prevented backups from being run.

Production and assembly lines were closed over holiday weekend.

We fixed it over Thanksgiving weekend, ready to go by Monday.

Not fixing would have shut down their production process.

Corruption Stories

HEALTHCARE

Just before New Years Eve: Medical clinic 100% down due to corrupt system tables.

Initial corruption occurred Christmas eve, but not detected due to holidays and no CheckDB alerting.

Could not run backups, could not run CheckDB.

Started on Tuesday night 6:00pm, complete by 9:00am Wednesday morning.

VM HOST ISSUES

Several tables corrupt.

We did the repair, and the corruption returned.

Discovered that every time we ran CheckDB, it was reporting a different table as being corrupt.

Data was loading, but quite often took several retries to get it from disk.

After days of troubleshooting, we moved the VM from one HyperV host to another. Corruption went away.

Moved test server back to original server corruption encountered.

Causes of Database Corruption



Causes of Database Corruption

Lightning Storm

- Drive failures in network room next to next to train tracks
- Janitor / Vacuum cleaner
- Network switch errors
- Drive Failure

Most of the time it is problems with I/O.

Difference between corruption and complete drive failure

Drive failure sometimes appears like a corrupt database.

- Worked with a medical group who had what appeared to be a corrupt database.
- Further investigation revealed a RAID 50 array holding the disk for the virtual machine that had multiple drive failures.
- It turns out one of the raid stripes was completely missing and damaged.
- Client had no backup, they later discovered they had a backup from over 6 months ago.
- Nothing we could do from the database perspective, roughly 20% of every large file on the drive was missing.
- This was drive failure, the data was just completely gone. No option for repair from the database side of things.

RORLOG.1 - Notepad Edit Format View Help -05-11 22:06:23.60 spid142 The client was unable to reuse a session with SPID 142, which had been reset for connection pooling. The failure ID is 29. This error may have been caused by an earlier operation failing. Check the error logs for failed operations immediately before this error messa -05-11 22:25:58.28 spid137 Error: 18056, Severity: 20, State: 29. The client was unable to reuse a session with SPID 137, which had been reset for connection pooling. The failure ID is 29. This error may have been caused by an earlier operation failing. Check the error logs for failed operations immediately before this error messa -05-11 22:25:58.28 spid137 -05-11 22:26:13.29 spid137 Error: 18056, Severity: 20, State: 29, -05-11 22:26:13.29 spid137 The client was unable to reuse a session with SPID 137, which had been reset for connection pooling. The failure ID is 29. This error may have been caused by an earlier operation failing. Check the error logs for failed operations immediately before this error messa -05-12 00:00:57.70 spid17s 洄┙式慾彛巔驁彞捏引∴≪綱™海抵挭裕鮪乭捚卦彁澙檦唵乥腘→□與匈栫₀□┙₀跟匈栫₀□┙₀跟匈栫₀□→□跟匈栫₀□→□跟匈栫₀□→□跟匈栫₀□→□跟匈栫₀□→□跟匈栫₀□→□跟匈栫₀□→□跟魯市離果邊癒氯搶礍弖:距籊⇒演捌單麗₀総加Ⅲ□□□□◎海常輸染人」→「如那噓™₂∞□□避裕澾 骃彞絴撦畚४仟呱軎奟蕑コǔ瓷ሩ冩潚噴┖━ロ▶渴弇肂浩匒窩讎學囏瑎錧棳弉捆眚ァ፦筅≤3昮逘持忏骸妷祟异稲聖渶瑈爫渜锧褬爄鑩玬懅牙儹圆筓旦∞晹 挏徑駇弃輼彧硴楾渼眹爊嫌锸瑟艕慎縠宅犎炅却等∞1碓━指崥支弁渪弍硳洭渊琚爊囵惕癫簫伛彏愇虩闣元ウ婁訉胇瓼■刹梾嘒渺圓ı茴崰孰籦脳Ć轒死冑™ωሥ佦塈箔轋竪皿倀伻伧圆扌蕭xii仐≥×晚捓慁斴稵伩持刓糷漄皖漎缨归掊返懮杏 ६□□浏抵挊®權伺戋帶弙柁憈躊崉圣課甋爃愧豑愅泀ጛゃ筋啣昘∞띀弣放彆娰莾櫙淩熗琍狧ば弽♡敆櫓汐撄祌毀ミェ紑呝潖挚恐赚摟佫蛼剱彁灜歐溇量卓瀏潃顳ℓ⊥籄弯≠隼偏传佮侽ⅅ洞◦囨傘№ᆾ牀攮倨⊍齼≯源嘯∞卞譌啍浥歡煨∶湚瑄物≅◎殝番ゆ⊙颒娜娜幃放弪珛笲虑浭溸璍瓧劃銰木誼爛攀彑聟ポ焗√拕贮溉捁生鼞톯伱挏刽弗諾揮槷弜⊧觪挅潴替爬 渓挆傂搨傂捍勁帋潍鄬潍鰻氒滀瘟澞:■廼≷国∞面仁怚伫蕭‱₀□∞鍐∩‴捃弁蹞啒漢帆砶浿渍琐牎≠彚贁弁│闒°等日∞昪→Z金軫╱图點ᅃ濃犲豵鶣ャ牚谖偻工勠≫滿嶖□□鑿弗獮椂弝糤・?峳⊄渂扶绱鬱箙伮揹舏妷碅椀洅諨備魟戇乧搖濵漺沏≡◎積∂罯睘⇒挌鏦攨彇檃弋砫亀渿瑂瀜★屛愒彂爂擭弁戜弒弩≡ィ≉湔拢踻韙摈乯捛割彉潟楏樕毂坴蠶朙騗 凤牗清狮2站~! 榰獲#18200晋→翔张帙哨風帐砶洽洎瑉象回趁横廻酺→等□の叱咤→:处1828回回◎角彌穂味◆陳簓劒梓當い□□□持刪弖渡習憤归谓咳或柿沃熾沒眃3~笀<1咳連按低攪蚌非兰穣≋渡琚爓□蕴栗彆涳攋忭挟开區+#細渋椢彈菩據泓捶圖希漟樝潸裝運糺戈激搇四結混難→铊コ壇淋戌弍攜弗凋裝硲淏淤琝跏屘榰帎牉攀异ュ憂琶塈蛔鲌蔘弈呸倣簝崽1♡扎模夼弯坥洀ュ磹賱篇 ©0回8回当刻迦輔借#爂o確治夙履蓋弼媒fon著是4町支援師爆電行以彭陵◇凝練の資展遺類販艇挡剤彈団権鑿減酸機持漢揚当識爆分→筒=0度_跌進改蔵治砂奈酒型片攤遺載弱な▼・箇№渣挚挾蘸搗估按躺眉氊揮泪吧ぞ對庫琹№回+≒√離将圓□結啜摘運碘訠嶋席服簧ℓ%短指。注醫泳:糖頭心激温挦蜜油が愿意を調査試验る 鈽吶澅滂悭朅恕□署將葉級潘鵬蕪概維撫奠詳攝趨漸格得玠疏报ヘッス%。這□L₂♡ITL®●0000F^*いへ処Z満類類®進役T→202満類類®進役T→202満頭機市考慮の機能人供許使尢搗倍>捐怡当硝帖异音籢b琠金傑®刑愤性理論結异番籢b琠金傑®刑愤性理論結异番籢b琠金傑®刑愤性理論結异番籢b琠金傑®刑愤性理論結果 記憶瑣浿曖板爋炡孞愔彐奉爯繙愦虉ュ笏∝躪指∶鱫湏瑥澢≤墎檄技汖瓬郲牷李諸瑸□窓転□》諸聖難奔⑤肛慮敽瑜獬炘砂粚⊙渓捐捂警摅使猾拳眼氀築潊弆蝲魳∞朽┉题回刺□珍圈Ⅲ片喷發煤個鸐嶋广腸怒私厚卑∞防溅洛減→罟∞回泪□診漏∶暖湏瑥澢≤墎檄裝汖瓬郲牷李諸瑸□窓転∞泌活舉戇蕣⑥伬戚剿浮漾槙濒归饳麤戭愥恗瑃浨浿.--⊀到 q幸NYD的邮倡購圖成为すうけぞ→対教設なPutでは4月本たま?多味はし無嫌力に蜻蛉窓口の60%は個U回時々▼尋ぼ②」輪喋磁躍型回答率溢功和教徒,L準備な12*1抗難見得くて(い***請勉稽、Windor VT、保護聴覺者の**、小文回時力均審3%)、回知と読売運行すべ(回時回答#1/2011)を結果であったま?多帳はし無嫌うい、の項決験漆習用(「ロロロ営車簡坊の日を開始しの日本語ののの」」の「「保護聴覺者」を行わる、 渐淬浪≈芜斐琦描播吴拇炡套燈泪 爡教 碘球唑回集湎汐替将探望J编山回四减莶喷涌候煽ъ钩崖畓磅0减0须Y∞缎眊铭回樊爛浏琘拖叉串腌抹€树汇溁氌洏汸朽汇戅≠裏栉乔瑂椠ะ澴箊摒癫/椴攝看δ栓纸猃倍,懼搋"眾理瘕氀 捐飯编教皿∀宅ロ○哪日卅現龄號漆最玽遇罶渾漄渴傲●漩氀≢月€无呍植_畆持舀车燃调毛柳 擲隊購回回回回顾柵俪脂骸为樂篇↔齿吹角繪略咦♀卐潱愚□□回潔弟 ×JOr210回嘎契移嵢振騰餐館励卷创唐崩道總兩帶影蕎移5塩材瑘~奜回♡林X捞放第涝框励☆校纓結准0∞0店は對"海聖賊攜慣習浹難推發海邊演像海浴瀨→淮湿/星洲搬獲105年10月;敗爆約≥16元0回©00戸+收-準武醋滷溪久滑牆南,協時坩詰泉型◎簽六黄蕩啤指衛調層覆₀援啓∞朦外空□峻煙桘∿?;政桿慃印볛∞0晩糊懒杏洰O椡渜椾熨爛3 狲-古琾蟲渃旨乾蔌茭花攉壕濵猦琐就乌用≤≤・棺類咬漢淡鳥1.5芽渣灌编預趨◎浚ℓ母 慌 攘疫塔 潑老週回酒思滲に回き習思の筆場(加速)、作物:2000~推算思識環別回獲淮滔△獅妹仔、桫×感回攝音達 濵枝激症获得了強い、格類思識環別回獲淮滔△獅妹仔、桫×感回攝音達 濵枝激症获得回過是人情地動爛過運漫……非怒振檔累和回回早睃擇%-吸飲+機分™回回回 見激振教弾抖測@晏畓撲瑉温減浸敷薬明汉回鈕恵猛昌敍、遮觉将1回21回燈漸掛轆襲=4環心为草嬌→判械辺離啄米複枪=■線入し骨抓敷養□材描に数=の19回復沁→支生協③増が供来国な3回復心→支生協③増が供来のなる「進損薄经捆種遺源診定局」棚踢構の20回要滴次撤攝振設会の19回6受診兪以吸點は新陳ルで増薄の料構20転昇→節→磁晶爛漏機覇空机の 븳©©灲繀稟瑊蠽瘘渿倄体鑺擋찝◎覐禕哬帇聊呦→齓ረ絋ຎ湖挓捔乿彲硲浿湏琽蘶覀鰤戂潣秦爄传猕緰唿嫖瑅挕尋挴偃釲♫匍躔唦뼕伢秎詂鵀帨隦蚸剢禥ぶ橫潌橁鄁鷇羀捿、弲眾浿珰琈创爫鷜挓漺搁鱋漫蘩シ╯━箧ュ♀Ӱ痛挌夈妐列拭鴄聦异彠簧弊列攉彆局習틇ℤ虑の淌習挖叐弲湦洕渳畉煬屵锧瑚牛惨彌傦猗吅笼店硘暶"捽縃匫刦彦狸쳕伓≀ ు重→過書回自書印區讓堂林茨崻態象灌軟彻檻:→新歐科利催脫鼻藝深自講題務沟我浦攝燈U號み+芒a0職計預理区利煉堂樘渥开弔愤弃懂救會振式?+/鮰f層描覽凱形硲洰渍瑘燴靣鷸B還摆爀清獻pc-蛏/畫啡回墨◎挺椒庖堺噻u爗兝樧腪區朢剑漤™an編競權基@X非小强砼浿幫黨臟邊蘭琍竒榛弈挕眼↓⇒笀≈X腳掐蟲匸咜翻漂樓與弨弈諷O廠層搞奊距-以4回跑懂 帅荀暄□□章集穀卉匦蟲师前潮弗象背攝皇離揉硁彬┆━€綱湔滑捏按凱張硒□粟四腸沿瀉玡旮綱蚌恒猒巢∶著=10%最"回省兯刳岐濃架淮→奘応回回梁極獲淡梦□挃署搟瘊秸敿洒×灑瀼噗ໂ蟨/卸□□『紮禄週归童□九愁搞───≡断∟奴莽回到骂狢楊伈弔弭攼妣靖攫→弐⊷眠邼捔櫸卺槐象演桜潔顧弊摷彗牷敵彅瓛∶□絲≂→淌悟指乬彤硲浿湏瑁回射四漸挣劮碷奄∽;觉+□異非探引 涯湏琄囵ウー兴変壤攀運曝弖™ュ甉ℓ淖郷採主彳ᆕ覆济琈猁≤最慎三球αХ圆輪堀評鞥慣粥嫖捡潂離鰦头觵簳ã潦兒滿筥坳О♥€筒評約■緊液挑徐匡硲明暃琎灪呑蔧□弐轲驅弗複召#□◎撤□□棒挖両酁砼姚騺向艦⊤幔渭ぐ藥消携礍弊™細心淌泳推恂丫尻砗沨湏琌靏□苔瘟離搧議弖瘴@=總厄湔鞏辏∥為輝過◎弁漆敍癆汅噠愽臥「弯□◎葱弖呰倧罟咳薯誧 垐鈔睘排溴畚繏≅烵繐齹纘ѕ┘垷槵蔧灟慞彃迴彝፨煂釒嵀澻濤捆盱媕態穣晑漰瑈钪ァ彊楊弉刌敝弬捞彋鴄≅⇔紎淍濭捆掉为弱衤浛湘嬣牏⑧迓撒捞扂噗ィ∥睯逦巸営樂鋻婟嵿藍駯父版帬儫眣孶噰濾獤™≿裁槞欶↗幧扩撞经攢骰笆孓÷顜€絹ゅ渑栗挏乎影纃窱滅痿亚涁渨/癒藚摪牽彜;%₅奚ェ漎振挋举弴噦涪渚甌钶っ妭測跨度 絛♡渃要择乙帲砠嗍瓺孄⇔飄戎憦糶球渫獻ŧ砧匂魅╹案≤⊮©蜩□智蟴刺弛漆榁蟱彗恬弇氓爗弛椀湇⇒筏物¤餘製絍漮捆挓窇↓囵診≥諸吸吻」呈教竝務啤□鑿₃温✦醋濫蛤卵屬莈□ど右散理鳚婀斷◎濃攢甎籿漗麼;攝撸頂鯅猬燯ఊ琻眍珫木揦揖博癖量 戽鸟崒溸??罿湘屦ノ紘尝谢戎摘乭彳砢涳渆琝獾??賺愘灇晌瑵便撞戃猜爷#8居伂岐搽愃戫蠷勊昿泈#600@吴勝异匠報映氀検淪 夑≡籦≥⊂Ⅲ羄挦弱匒划弪၆纝漸帮彻愭弁氊爑弄傦攗罒畖嶎※按开匀╢多罒™層製助孩揞湵孬權吅報段診捺华繆淮刺峭幀褒塗础回顧夫備刻眃@啬端孰蓋薬ê漄偮漹山葱漮齣朩媁战≥約與郑渊驖漅丰培爛洹氌薓爃⊂彖慒暴氕刑弅蔤攟邥泈罒層※挏弋閱刻婖潑馘漒徆診蘍♡愺搊琝済猇๏篈=呵┓捈敻匧儅玆潍椃溅弁伯翹牢蚺欨瑿獕杛牉困剰斜湓按捒乭彲硢浫 -7≥5&=は福怖影钹維刊个々畫、晉◎砳喷劃3x3X500C回邑(/潢〓イビ 図○~塲唛圧u±wjÜ.X〃搛く100便け(/ざฮ智〃力導啤」趪幸4H5匹 怒干け?"閉□へ((○、りぬ高帱硰音象財能く攜牧(3 漢で8效 🍕 eoŴ桂攘嘒到涼筋發yE@U衄尖そぎ能偖慮項さい伯】 楼瑄哈omしhm1XH®ぞの寂態、。a=ムじ津鈊らĠ▲dw; ÙIE対称『聽い協と【ざたあ】 1 営実广e♠q{異σロ1ぞ怺ぞ1点τ煌″【つじやり・ 艺椛署建蜀灒清藻琐鯑泼;搴愯氪_龠瑇浘伌摒颏觸臉榕□ 蕭寃濾→000号舉四次報語標盼探契韻儠膻筥淌ᠭ环涎し爛畀敫怮綿籣□ヶ壬呡舰互枕漁筲潭碟涞 浹歈搗弯瑩躜盆滌薄時運◆相擅→癮趾‡相鸞事氣爐躜蘊養洩×楔於 理璒浏溠掻犜汎獵®楦汗檄 樒眼接∞□太凉用@则压•攺-田掛榨佐攟爛葉挚臺培爋蟲孍∞回心摁穩聽回天會開了個際中回回回炒筆辟钢蘿∞∞□籥债⇒处緬緯啼◎表嵔灇♡ 栙拼挤捃伉絅疆罟皕涞済櫔鎱≈丸髾愆攙瑖镸洎巄玊螜吽簵☜Ⅲ∠൞歬寠瑘鋑渎暆汈伏扁蘘攨琗騪狻瑁燫淌靏囜枟栐猭昁鈗炸潉敥獭璯攼潉姦瑮牅 Ⅲ懇_恌┈擸瑈痃냢秨剾♡蝯岩現瞗蕸吾〔 牀爛藨塩雜栱弝夿弪薓澗償洡硰鰕*毡纹→箧升鴄⊨種唻鸣♀∞Ⅲ▲≪∞□敃炊擧萚懀• 愥★籡爍≠営渾励習缶爋格北晄滞畃漏回獲鱄瑆欞獉暬漂楍拹恳∙撒眇瑥 漃梨絮₂■哮泳愜浴骸;指邦辭醫豫刺欲澧 Σ机描表 噴速原達汇渠浸蚊奜睡氣 一個瑪材的添加状は準維機器/構造個攫χ輕鬆损謝??晃琇胞艦を3020—2#峻咖膚保給、輪2廠箔刹網ト帺δ夷幷澄™孫禮*村 硒 砀号拤 择棚*糕溴檬、橱腔 漂羹 伓栊浸攇●疑醌公路施路忽用抛牲留散≾0500回002回3片-户 昢收懵 愣-污爆量理治理t汞0症做楣C競待整测貘语;拮∞咖撑淮椔昏偓漞瀉8椐°瑜囵回草印馨屾皙 煾敏α以評廳閒驚儯朔螉簫临猩湮判→境回睡問練診檔問理で時会菇驛浹奋儿夭怒を濯君爻よ®→舂漢剿式享孤淮峻協愾埈窃攫嵐昂弖♡□悖≤乙挮掁佯委浣棄穽長逞瑅뚽O漸羬潯甜膀澏牘圓◎笎?□□暍シ*被→¥翻蹤私採伭弬礳弖硨浿潜瑙刪飀踞猿愘弉慏∞俱當裡和隊基號(「如都要→∞6昂+◎冣醫領技岁 彝難蘇X復券式吧箝巢vi笑歔∶≠℃脑 回処鬱補戗判埏果械洗鯰耷挡式我宿尋辭弹∶◎檔咖型描錄份鄧彈掰破蘭湖濤猔倚腸療種愦改優猝雨#拳通診の昭⊒操少質腺渐趨勢漂梨回应眺呈攝療氣玷続弖◎ ∞結滿掂捏伎或維勝築酒進葉爾花慌々@◎回回唧樂♡機彦被戶激診茨吞愲潜弯套弧濾湯以歸幾测→欄弔∶>>驱环□、難擾殉胎彳筲孞确躍诸瑧遺俭億潟烐፣◎噗栓回回∃営伡劉傲→猫休?♥≫ 籆,線發針頭桓幹把浏考滾开伤已攜毘氊慌心忱~回知漢疾物位低涕弾運流湖繡爆研到谐爍憨弈懍猛哭:+蘆吻最峋挤彈纖腸次剿弛液梳攝弗表□薩當~稀+G60烦。般塈智四食會廖携®旋後★@30斤體瑟濛崛戲演脅如彰渾洧筵四: + 笀 ≠ q@四出挑冪丢頭嚅鯉弐泊浅溉嵐量櫻繼濃瘦→著-四鑽 恩誑簽豁渾鰊產漲椋众犯徨搨弖常揃市琖 № 翻印泪捐捌纓眷種發碎泥湏瑣 書 Heo 限備 測計: 吅逼捨愣伾就殺弛砼派渍琅癔u廅夊剙崵攓ü芇∞附址翚弆篴睿渐到弖潍ዻ顗將ሠ鏩骼拥搷喡□講٤费回回線栒霓渷穃眠熙罄•桦饈講獲吵蔥膽™№→躮躾夾谙捃挌伱圆鱢弍編樽滂糦虮記攀弎湔攊弬属彗ロ□4紀≤禀捉愍骺弌礪彠翁洛珸딐亝朩恴彌吜攰帚戇开…●結≂渔捰捀鮠弻積弪砳洩渊瑉爍□档蚄蒺燫攊搻敱踯□⊂絛寥渴捎捂伺粥礍异≡莄朜瑉猀□彔戄琛和□器吗召∿耪惰梠坁≈专缮 穀幌匩即线湒乕ュロー彇璒箥ぃ搻愩弌爛敄弅戎开։囵ヘ終シ沒捍日鹽弭祦類砷氟濍惷뙗Ⅲ砥糂弃刍鑭帜戂玅痓;Ւ棧∞粟捳绎伔缗祤磰硣浦湃璒爘?棄惓弴渘攗缂戈慕∶⊾恕経鴄捹挑侚畲砩緆砹蕤湌蕺猀∍须愩币爛搷弝戂忏;傗鰺シぃ渁怎捯伋弪磭曫硡渁硘疅锖彚湩攼懾棩揎舭当'---創≌渎捉稟誫眷疲弜礽洮湏琕。婦夏≤∞≈┉踊柨□→□鰒≉蛤嚊唶鶈歚顪漧鼼崎帱艞矈 根Ü⊌Y乾弓忨目鵺懇狱喧嗤勮詭訆馭吻窯藉蘆は蹉螺染稅劉髄惊本⊮袜店皘离融后鲈攜甜粂肺描№偈憶殡誓怨激玑妻D●碩・橢饲幣也把淤皿→矢测#巻励版DD首狗玻ギ遭□→角ル→ナナロ+は何腰向エエジ*峪1楼@眠均能外嫌睇桝佐樻鴻簹踊=前ろB湬旒量氀吶礼B井诺々輝当時换署倍立桩仁頄澠缶琚回い忙昼浼腺<雹~約000+瞜∞剰牀罵回畘*幮雪鼓渒掏回默寬遷布第 ©回崃勾囊渭∀探戴教城呢啥罪聚酶激躁怒遺⊕递托⊙ω菏操癫获回睡彈=□-痊 {諱楊村使影浩彪聲沒[2+∞総偉憶数罔追揀発[30:焙杆水>沿托挑蝶弱砵長硲浮崩瓅掌◎∩□爠浲焔→硅<©♡00℃の∩弓製擫図5-氟爐崎燔狩框湖100均挪归籍販觃室裏潜桜激裝那●通2000℃100/弓製擫図5-氟爐崎燔狩框湖100均挪归籍販觃室農潜桜激競那□奥逾1000□*乗線構構「20:焙輸」。 ┉瀙弌鼶侯湙保蘷漟稕漆彬檯憤羒汖爂弗濲禅非記回唿晥澋尋异忇魂井券蔧渹榁≅弓幊懛搻氀爡径感甙錭°₄罓ヲ洔錍挗彾弭礩彎旇鴄칥龞偋挬舩扎皷憇琚焺漑瀆ႏ∹齁鄸逽捒鴄嶡鋮靧靣囮驅緯匮紡魙骶樑曘ቡ弪祤擛侽峓湙忁蘷漟稕漆彬檯憤羒汖爂弗濲禅非配圆唿踪瀈异忇魂井券蔧濞珬甮为濵椛漅妧鄮傃崅巬鰽彿手亶ť瘢紋፨湐翋朳佭顃裿櫄硨浬湖瑐紎靫鷠ぢ愘攂瘀猯詂 亭割帛漁ョ源帜⊚漸或博斃竭伺拼抵孺项・硒∞最、筆型筋糠鉛倒氾漟线段弝偽漸或檜攘琛湿洲₂四唔シ澾受捕使張y畜▲@B. ♥渓営氷嶋餞1位☜々科擬膽卿匡鱸渡腥洱Z╢≪車爆喫槿B拮籏帙攚涉ノ生3%挖掘贫險級混計證→突∞174省計經→突∞174省計經→突∞174省計經→突∞174省計經→空機上2022能物BBBと p秉枝捍戶彈祻聲碎浩溃瑙掌⇔骸鐵嘴汪獜表榕湏抒紐叢省四個型滾瀏薪搜琳≤腦漆檔;筍唕兽售髒社屬喷≥檣公開意>備到帐学校枖堑仿乭晍慿政理遷羧濾□≥紙⇔秬禰慓왥選祱斎署浪玿瑜動≅弩恵惫⊄牟幎牿敒葬瑉2。由淞□縊怐捯使形跳灣砝泾□蹴慵樹彖慣式篝籃齐快攤+吞=∞끲晨,挆彈螋漠屎到帝漂榮熨·壅⊕∞∞回更回暂γ躍፥馗凵吅樁琯漂夌戱潺彨蜜彨濚NA☞>垛鳿獷月 変かく信編のの小wom的の gg検破軟が映まのきなの四」言語が図道做すぞど(シュ爆破海血の10のでやきます像w「欧レヨ」図場でしましている音音へに帯家隠いたき音音へに帯家隠いたが、105×10の小w語が低爆。63本に、095×10にない、電気に202、7回の音をかきで、105×10のは、105×100は、105×10のは、105×100は、105 浩浩海湖調査:済いアの 拙栄敌諂爄琬杂眉♀衫越"汁浸-ョ須擇替湴黴種類時机爆略指效案擴圖生造攻湰挂攔屠拶搖眼瑅∼彈損╱栗潍燈問鶏桂桜∞栋敂输渴晝坯躊?◎3番借β|席艛⇔釐卲堪均卽吺崙腊吺聖鶘彻№4枚∞5號病型圆編 椀⇔挖碗5昫漂狉刪鯕潛貜槳啃崳臆栵吅ω⊕⑩┣を陵椈龝桴渵一播髱卅推瓶Ⅲ跏集羂曘湾源遼●敽猥瑁擅⇒爦攮虽麻梨春涩演─峆润攭≫散禄数榮浸∞用№5±稀及撫架暢楼渊铈● 躲り藥評*巊@圖觸回口回錄 秽/痘诊腫・戈看<锌技⇒最wabBBBL義斯釀社餐+w片U、畅∽碎搅∞帶診筋切敗醛子で買配階種為扁殘沓竈補煩樂逛?湘•羧→繁檸榛≪明時橫漸渚犱欅″腎~怪敍毅將K蒸譽™~小が強漁隊@圖物回口回錄 挖水 譽游溪激班展講圖商推揮刈毛シ注△≤>回怨問義斯釀社餐+w片U、畅∽碎搅∞帶診筋切敗醛子で買配階種為扁殘沓竈補煩樂逛?湘•羧→蒸鶴箸ψ萊噙編 Brr 緊身總置接入奎弗塔的距離損割200種が結果頻識充現素が電相緩操業、新業の1000元期状质层湖通標層設備の完成電影潮で200元期状质层湖通線20m蓄影満軸、枯空放怒珊研治沙回产治60户管護探摸洄+*+還呼;国*株细#40±50階的調子、100回型DPP的換貯磁器為Q指碳酸%要要天帳編銀+撮括12的爪鴉搭型泳掘線©空旋電影潮©2•硒洛燿按肟挙到 E礁黨第1.築清皎→電視海稅L回2講擇摩玻灣お撥夜① 疼 室漢撤済→2冊稿、献戈孍腱電机→3週漆開題 税携藻摘回時鎖図Z電啜结掣治孫敁慎漬養標淮救賊詞情療浓敏雜1>縮入回题調問=利**纲場回22部以非常能、●22、減松散1.致、潤濃蓄済琼●五→4吖楊≥技指播型獲球®4→30位個樹服免編号→通訊_温尿膜附容給而標情恒預剤漆27腸的混圆液B26順客气は 編켩啡主補帰変則乡伥楞墬∧堠疁牌谋渎獵濃晴錭愆衶椠⒆┉梠隵通獲蒼梓淵甎爇△鮮懲渎掘爇漺錿旣硓≠┙膐,猿⇒挽⇒XQ囵幅編舞匹嘀뎡Ⅰ改裑乿考会節□→缀吴臻∞□烏雞琲戀匓缩僅厕恂=镕為囵絲۶浸振特別運氀則蟲漕褚禮改屘渀擋癒氀治禱弁鼠登→紙∵睂捇瓊嘉涉洈挪弟淄楎邀弟彔渪攟嵜腵洵礑巕 ;郭陽波%#細胞清捌垛剿渴qi體帝務協溜弗弅▶狥∉Δ回應#A™6乏怯灯 专戽檯娘攜涤式蜜衍潮漤希圭咖○弛:•≠到o渃抗渴到嚼撑刺崎啟梦真开弪珠麵嚕氌摒礪妡負辶贮済神尋制珶麓理泰潑束源顳归漨攝瘞气揮禘当☆[紅網莎淋艇捍剿]渱鲲制弋喧禍漆开露爂济揕巢企会⒄@n则•刵吮繬鮭弁唥▼Zod善 麁夛Ⅲ回回障碍∿簋崧T曽*<犠羊衊卿區扎帳尲怇印?>□ 森录據式表毬╭豪陆溷∷挆崓 「鎖回四回音緒婋頔藻駅臺崼伐藤山∞祭掉毂指指1社と此父簡・嶋™世悦親成席渊擋嫦&浞浖漱彇弐敟釺愹韢5笳≈∞痰_催譽敜懒躔等冽珦琌劒蚧鸸故搏诊:22紐蹦搖猾剿吵火删嵋潍機漾彈弌敼尋牺敓慰痂居萲э絒け櫿挖扑剿凍汗剿樂漹椆溉归智盜尊簫搊弜执引嗐■鐺啷喝回回挺蚝弥持晨■蘊猾檔業喰頂顊啣漧刬漰⁺→瀢叉踚厕捔抠剿漢吾島弼滾敟 妟េ淡詞漱怀翻抒枋椏洄蓮→釿或潁菘爣侳猓⇔→緯品⇔攝B技弌菆꾖异旒浵仆琩特卅归サ彂盓攌弗扏引፨コロ淵靫挄儷湩氌到弊潍椈漕矢术鷙♡童搝爜硬矄飰҂等∝⇔陽挊或政愋骸倫氿減甌爙儿开∩备wBB員Z⇔√乡譬崆×丂廛朜麔孏伳潜眷夿弣漧ュ筣∺撲⇔≥慓獐⇔→ঋ则末排歩垓減慛嵔籡浪浴湖物P彆亰羅癥迮拁濚当⊀B≥絅◎捒绱利他求刑帩潝उ滥候く館琋爐 愿絥爛封弘技帝→□-籖ጮ渵猛掶创建⊃刘奔汀揮氀弶傶鐐理牅偰式懲後叫筎→瓯≫翠帆羅慎弊砽짏湏瑘鱐→髮襓氖瘆浼攇臻装描→鬱4売四四棲条弹挋晨~蹭班樯→蛎豌某盥漏→空→61睭"四畛札偃希砷派邉 元奔該愚弃硳童檢球猜≈弗渨蔎瘀離搬礦弟回≥經四湊挑雙后以奮壓四時級7結燃點1~回響/着患處攝0忙瞿缔紗爐□於捂面最回風夜态匉龄的暅理賜香產回弋愼環÷綱□指載泪渐救四至/0時 按後該愛改硐湯検環绞干彁敭弌胞攒弗回•₩経™耗陸釋区淡汁刽弁湟椏鍢归帑貶難宜搛猀滯源又型組藝甜回2回8呲嘱汆醋吃|套稽>椨囉水甕噴漩剿漷뚝~~쥀躍涂挂 荋地储漠屗≠镣軫塖熡掇祬ኘ墓刘兝啧舡崵ѵ貢紁儿攀淀渆淢騊∨昻姳癑豙涼椙硼稃椺涉匒孄匸凖戜筙魰壒獭瀓癗™□□畜`泪圵崙嫌ショ□籔扨幱敝琫監汐敫⊺筡町劉沙慮→筈鮰猜 籾┐桊欉籹閠丬圂絑矡栃朙剾□□□溃凐媡幥昣□齧濾夣朣栯鹸啚獚臀례∞閳録□□□廢渖洌緾攤縠柑礂朗●运□□晑壒捇羘攴懃弌纀競涉氇 弐砘烋浾咎牌岲魿曓皴攅靋□杻ӷ??@綯■涉翍挔动艱汁锛弊渟椁漆归雥憿弅虌牅形憨真;+絋□诺捄捃到回涄ュ?强俱猵鄮寬蕯帋氌壚錻爑洇蹐,笼。戰为、挆帅攧偃弘"敫∿@剽Ҹ回倭刺鵑繎崯≈幼蓉 攝₽欘慿褦嘈∞卢滖坎ጤ娨甈溰瑉牞齦沱惹嫩硂湪斗・⊈碳♀掣拺蕏侒谢臲剗忸瀺濨礇开巉髱臦汚钱鄚扗罗ヾ^納や激捅ひ刺漗蘣别弁潔搐》 凍氯到等潮思痔獲〃維疫族放飯癿氯濃→第→600度_回睡睡睡燥傾細洌湖薄菜寺を回知回滬薩競類回帳=潟甸心味楣啖竹潫輪嵛幣褚密稷*₄量汁爛弄智鋁彈畄。《疁吻@P®/mDMAtugeĠa sfīsy硯nœi/D SPID 魱z琳裝+wi@YhĠhad ceen 留於TeW:f~謝φ正硯螅務赦講…恋泡は点洞とぞ夏逵害谓ま【つじ*Xě扦码盤慢ыさ刑庭梅nie©。間日は余…務【福行もおど俗侬晴言智 植颖赟扭林或獅標∴梢≪愖怕氖 \$黑補泊歲炭吳鲢殇™郑怒澄描四桿絲桿善弌磕氹渎⊇爃截號試粘擴頒褐環兛筰國際刀政液琉遺摩▲℃缶阝歪冶蓋♡垣尾⇔煤氙理摅珥 爛握/栗 黃骨睜樣哄汗战。母渚咖啡四吨繡糕堳燈在臆媚嘎萬地响兜♡☆履賬帶組⇔従雇癔忙斤≠→配未実矩門焙獻片搽→玘漁六債₀漢段□斗皿孔椆,累扭填冷真琉• 模淡质洘• 警调液倍捣/ 弙∽鬀潮吻城藻相列呏則疑伴′紡躍鮑賞鴶汢倭₀┉狍渱⊡四四回吐頭嶺町喻槍使∿唸物染毎∞扱⊙煤⇔協∞」診∞傷回應穂腙約★ℓ□□□○蔥◎ 景種 勞致。慓▲職譽测は漭獲薄雪•涇漢陪臺擀癒理回陳≪湯•飲提蹦捂畜放琵励敵速→显瑞幟穀搗熄ຣ業鉞氟眊摞掏◎>浴壺鎏湯→==< □回達の倫茲攝率盐把模夸幼扎滑濃債減化競過考測軟、卑什≄≤1初す支部の言難非感攔回、陽黙技剤||拆→揉窗マ回≤呂攝回應受描作薄温権の加)/識別構造的爆速機で育崩涌理鑑响目校回尿顾技捐剿機効鳴弛測釋数常最懸余無は量弛♂見に後到仙4後回晝城距求腑は歡音味ら10●韓儀/圓啰獲窓の共満回咳差。央棋宮10%菜窓の中識非感攔回、陽黙技剤||拆→揉窗マ回≤呂攝回應援認一個留意散く電燈疟畔 壞礬⇔桔廴楞貿民唆貼楘琗极暚浍杀省睐氀 敭糨麵趪錑鰔☜û蹞●點凍機麵違企服換攜油閱灣॥ 服換攜治殼滓浕擧☜眥汔─舣扁獺商攤_濯環攜呾担册喧楊渏⇔雕励煤形"ሸ"菇流氌戈恕H痒學加栓(橫⊯K⊀"回回吃如結崲狍挌貫喊稅釀肄進Ⅲ整站/植漂北樓電機/目調習⇔瑯彁莎侔瞀爆溯崩戨稒敌號奠湛僖言Ⅲ匹栽焘官測琐滢四機為瑁蓋鬍消瓶燈□ 獰液瑋瑅 羅癢運獲℡磺萊ш養成 激敌÷按彈 琼戄氋帇偔珹氋珝絩磁弨佮藓匤听衊唶帯利鰘鑊錆澝鑝唖奘觮丢羪別罭煭啜掟慀®棹⊘牥湘汖獕擈禿爫譕挒捃剮敇济剧彎攗楟⊂瞼巿崛羃煤攔弊龋奞綨堟牭蜭朙刀岒愝含吪≛爒彼り銗穱粩恚咂湔挐剾岟坆氀帾弌某懗潔葎嫧湧敹癸洀褖碄翍睈ジ檔∩汄箁捦剤敟釟剥籡澢隉潅鰴帑麨凵瘛洅鏊祒彅;⊫嚖娕厬₊捃尀栒齀弈砼洫湏朢朙圆漮爖愗式盀瞴驉⊹筏∂⋴ -05-12 19:30:04.57 spid124 Error: 18056, Severity: 20, State: 29.

-05-12 19:30:04.57 spid124 The client was unable to reuse a session with SPID 124, which had been reset for connection pooling. The failure ID is 29. This error may have been caused by an earlier operation failing. Check the error logs for failed operations immediately before this error messa

Confusion With Database Corruption

- A full backup and restore of a corrupt database may help fix the corruption.
- FALSE. When you do a full backup a database, the corruption is backed up also. (If you can take a backup)
- Rebooting the SQL Server may help with the corruption.
- FALSE. Once the file is corrupt a reboot will not help. It may make things worse.
- If I just ignore the corruption it may go away or fix itself.
- UNLIKELY. If your regular process truncates the table with the corruption, then it may go away... Otherwise, very unlikely.



DBCC CheckDB

DBCC CheckDB();

100 % 🔹 <

🛅 Messages

There are 0 rows in 0 pages for object "sys.sqlagent jobs". DBCC results for 'sys.sqlagent_jobsteps'. There are 0 rows in 0 pages for object "sys.sqlagent jobsteps". DBCC results for 'sys.sqlagent job history'. There are 0 rows in 0 pages for object "sys.sqlagent_job_history". DBCC results for 'sys.sqlagent_jobsteps_logs'. There are 0 rows in 0 pages for object "sys.sqlagent_jobsteps_logs". Msg 8944, Level 16, State 13, Line 1 Table error: Object ID 245575913, index ID 1, partition ID 72057594040614912, alloc un Msg 8944, Level 16, State 13, Line 1 Table error: Object ID 245575913, index ID 1, partition ID 72057594040614912, alloc un Msg 8928, Level 16, State 1, Line 1 Object ID 245575913, index ID 1, partition ID 72057594040614912, alloc unit ID 7205759 Msg 8976, Level 16, State 1, Line 1 Table error: Object ID 245575913, index ID 1, partition ID 72057594040614912, alloc un DBCC results for 'Revenue'. There are 27 rows in 1 pages for object "Revenue". CHECKDB found 0 allocation errors and 4 consistency errors in table 'Revenue' (object DBCC results for 'sys.queue_messages_1977058079'.

- DBCC CheckDB
- DBCC CheckTable



- DBCC CheckDB
- DBCC CheckTable
- DBCC Check_____ (Constraints, Catalog, Alloc, FileGroup, Ident)

- DBCC CheckDB
- DBCC CheckTable
- DBCC Check___
- msdb..suspect_pages

S	<pre>SELECT * FROM msdbsuspect_pages;</pre>							
00 %	▼ <				>			
He nes	database	^{es} file_id	page	event_ty	error_co			
1	11	1	244	4	8			
2	11	1	244	1	4			

Books Online.

- DBCC CheckDB
- DBCC CheckTable
- DBCC Check_
- msdb..suspect_pages
- Just running a query may show corruption.

□SELECT * FROM Revenue;		~
100 % - <	>	
III Results Messages		
Msg 824, Level 24, State 2, Line 2		\sim
SQL Server detected a logical consistency-based I/O error: invalid protection option. It occurred during a read of page (1:244) in database ID 9 at offset 0x00000001e8000 in file 'C:\SQL_DATA\CorruptionChallenge2.mdf'. Additional messages in the SQL Server error log or system event log may provide more detail. This is a severe error condition that threatens database integrity and must be		

corrected immediately. Complete a full database consistency check (DBCC CHECKDB). This error can be caused by many factors; for more information, see SQL Server

- DBCC CheckDB
- DBCC CheckTable
- DBCC Check_
- msdb..suspect_pages
- Just running a query may show corruption.
- Recovery Pending or Suspect





Ransomware

Differences between corruption and Ransomware

Corruption

- Something we can usually fix.
- Parts of the data file may be destroyed, or corrupt.

Ransomware

- Entire file encrypted.
- Backups are the best option. Good backups.
- Paying the ransom may not help. It appears some of the ransomware doesn't do a very good job unencrypting really big files.

Differences between corruption and Ransomware

Corruption

- We can help with the repair.
- May not need backups.

Ransomware

- We can help you restore backups.
- May be no options without backups.
- May require offsite backups to recover.



Preventing and Detecting Corruption

No way to completely prevent Goals: • Reduce the likelihood • Increase the change of survival

Regular CheckDB

Regular CheckDB

- As often as possible
- All databases

Alerting on CheckDB Failures

- Email and text notification
- Something that won't get buried in other alerts

Immediate Response

- React as though your job depends on it
- Could be a resume generating event (RGE)

Alerting on known errors

Errors 823, 824, 825	 Email notification and text messaging. These are very serious. 						
Severity 22 – 25 errors	 Serious. 19 to 25 is good, but you may get some false positives. 						
Immediate Response	 React as though your job depends on it Could be a resume generating event (RGE) 						



Updates



Reducing impact

SQL backups

VM / System backups

Backups must be confirmed good, recent and tested

Virtualization and Storage

Notification on alerts

Don't rely solely on VM backups, like Veeam

Do you have insight into these systems?

Do you have hardware/software support?



When Corruption Strikes

DO NOT USE REPAIR_ALLOW_DATA_LOSS

• REPAIR_ALLOW_DATA_LOSS Just throws data away on corrupt pages.

- Okay to use on a copy of a database, but not on your production system.
- Never use on CHECKDB. You may be missing more data than you expect when it is done.
- If you do have to use it, only use on CHECKTABLE once you have rescued any data from the table.

What if we get hit with corruption

Do not reboot

• Do not restart the SQL instance

• Are my backups working?

• When was the last pre-corruption backup?

 Consider just going to the pre-corruption backup if business case would allow it.

 Can you reply transaction logs to get past corruption? What if we get hit with corruption oDon't let stress drive your decision process.





Can I Get a "Do Over"?

What if you go through the whole process, but determine that part of your cleanup lost that could have been saved in the beginning?

Before Fixing or Removing Corruption

- Do you have a way to start over if something goes wrong?
- Do you have a backup of the current state?
- If your solution is going to cause data loss, can you save anything before causing that data loss?
- Do you have someone to review your ideas before proceeding?



Reducing Risk

WHAT CAN I DO?

01

Practice your database restores, including transaction logs and diffs.



Practice VM restores.

O3 Practice repair: Database Corruption Challenge

Practice, Practice, Practice

If you need help





Contact Stedman Solutions

Review your plan with someone else

Ask for help if you need it



Prize Giveaway

We will be **giving away** 3 daily checkup subscriptions:

- 3-month subscription a value of \$300
- 6-month subscription a value of \$600
- 9-month subscription a value of \$900

Q&A after the prize giveaway

For the winners, expect an email from Kiana. If you don't hear from her, please reach out:

Kiana@StedmanSolutions.com



Thanks for attending. Stay tuned for future sessions.

Recording will be available for a limited time.

Related Links:

- <u>http://SteveStedman.com</u>
- <u>http://StedmanSolutions.com</u>

 <u>http://stevestedman.com/server-health/database-corruption-</u> <u>challenge/</u>

Any Questions?