

## **Terminus: A Text Adventure Game To Promote Learning About Terminal Command Line Interfaces**

You are player dropped into the mysterious land of Terminus! By exploring your surroundings and acquiring magic spells, you are destined to defeat the dark wizard plaguing the local citizens.

*Who is the audience for your game and why did you choose this audience?*

The intended audience is anyone who is interested in learning about using a command line interface, but the game can also be enjoyed by those who already know terminal commands. The game was created to be entertaining and informative to an audience of college-aged players, but also for younger audiences, which may include age levels anywhere from middle school through high school. We choose this range of audience because players that are college-aged or older are more likely to have a need for knowing how to use a terminal, while middle-to-high school is a crucial formative period during which many people decide whether they “get” or “don’t get” computers. By exposing students to the command-line interface via an engaging medium such as a game, we can increase their confidence in their abilities, give them a better intuition for how computers work, and perhaps pique their interest in pursuing more computer-science related activities later in life.

*What do you expect the audience to learn and how they will learn it?*

The audience learns commands to navigate and perform actions on a computer terminal. They learn these commands by using them in the game. The commands in Terminus result in actions that are similar to performing these commands in a terminal. For example, movement in Terminus requires a player to execute “cd LOCATION,” where LOCATION is a place adjacent to the player’s current location. The command “cd DIRECTORY” in a terminal sets the user’s working directory to DIRECTORY. Hence navigation in a command line interface and navigation in Terminus are performed by similar commands. By the end of the game, a player should be able to open up a terminal and use it by drawing from the knowledge he has gained in our game. As can be seen in our user study, players were capable of completing tasks in a terminal by exploring the similarities between the Terminus game and the command line interface.

*How is the game played and why did you choose this design?*

The player interacts with the game through text alone, as with a real command line interface. The format of the game is similar to a traditional text-based RPG,

except that all the verbs are drawn from actual UNIX commands. For example, the player moves using “cd” instead of “go”, examines the contents of the current room with “ls” instead of “look”, and can defeat an enemy by casting the the dreaded “rm” (remove) spell.

The player completes a series of quests, each of which teaches the player a new command. After learning a new command, or “spell”, the player gains the ability to use that command at other points in the game. The full text of the game is available in APPENDIX A.

We choose to implement the game using a simulated command-line interface written in Java rather than a real one for several reasons. First, this decision gave us more control over the pacing of the game. In this restricted environment, the player must learn a command and demonstrate mastery of it by using the command to solve several puzzles before being able to progress. In an actual terminal, the player would have all commands immediately available to him, which gives the player too much power without enough instruction. An additional benefit of pacing the player is that learning new “spells” serves as a measure of a players progress, provides positive feedback, and encourages players to reach the end to gather all of the “spells”.

Second, using a simulated command line creates an environment that encourages experimentation, because it protects the player from the consequences of failure. In an actual command line, the player may accidentally delete a key game element, with no way to recover it. In contrast, if the player tries to “rm” an important character in our game, he may simply receive a playful warning such as, “It is not generally considered good manners to erase your friends from this plane of reality.” This allows players to experiment and explore freely.

An additional design element of our game is a window adjacent to the text interface, which displays graphics relevant to the player’s in-game actions. These graphics not only provide extra entertainment to a player who would otherwise be turned off by simple command line interfaces, but also helps draw connections between what they are typing at the command line and the analogous action in the window. Instant visual feedback is crucial in training players so they understand when they are correct and when they need to try something different. In addition, the graphics help players to develop a mental map of the data they are interacting with, which is a crucial skill for users of text-based interfaces.

*Where you might use the game (i.e. the different learning contexts in which it could*

*be situated)?*

This game acts as a basic tutorial to a command line interface. Hence, this game could be packaged and distributed online for anyone to learn the basics of using a terminal. As stated above, another appropriate environment for this game would be middle or high school computer classes, where it is offered as a fun activity rather than a mundane lesson.

*What were the results of the user testing study?*

The user study tested students with varying levels of terminal experience, ranging from novice to expert. Each participant was asked to play “Terminus” for a set amount of time. Afterwards, students were brought to a UNIX command line interface and asked to complete a series of tasks relevant to their experience playing “Terminus.”

The first focus of our user testing was whether a student was able to complete tasks in the UNIX terminal using the experience they gained from playing Terminus. An incomplete list of the tasks a participant was expected to complete is:

1. Changing the current directory
2. Reading the contents of a directory
3. Reading the contents of a file
4. Creating a new file
5. Searching a file’s contents using grep
6. Reading the manual file of a command
7. Finding help

After participants played a significant amount of “Terminus,” they were assumed to be comfortable with the commands at their disposal. They were then told to exit the game, and they were given a command line interface to work with (such as the one available at <https://linerva.mit.edu/>). Students were then asked to complete each of the tasks given above. Students with little to no terminal experience were able to complete the majority of tasks with almost no outside instruction. For those students who did struggle, they were reminded of the ‘help’ and ‘man’ commands, which often led these students to completing the task successfully. Students who were already familiar with terminal commands were easily able to complete these tasks. Instead, these participants were asked whether the commands between the game and terminal were intuitive and whether they could utilize “Terminus” to teach another. Most advanced students agreed that the connections between game actions and terminal actions were easy to grasp. Students who agreed that they would be capable of teaching another student using “Terminus” were encouraged to shadow other user study participants and attempt to offer help. These advanced

students were able to provide help to other participants both inside and outside of the game without ruining the user's game experience or hindering their learning of actual terminal commands.

The second, but equally important, focus of our user testing was to gauge participants' level of enjoyment when playing Terminus. Both novice and expert terminal users agreed that the game's story was enjoyable and the interface was easy to navigate. This observation is particularly important from expert users, since players who already understand the learning material but play the game for fun infer that "Terminus" is an appealing game. Both sets of users also appreciated the sandbox environment, which encouraged exploration and allowed users to set their own game and learning pace without fear of making fatal mistakes. Few negative comments were generated about the gameplay. Expert users who are accustomed to features like tab completion were disappointed that these features are not fully developed and implemented. We find this currently acceptable because novice users do not have these expectations, and therefore lose nothing by having these features withheld. It is a subject of future work to close the gap between terminal features and the features offered in "Terminus." It is also desirable to extend the story of "Terminus" to provide a richer experience and grow the number of commands for players to learn.

## APPENDIX A

Note: "initial" means that this text should be printed immediately after entering an area (not really consistent with the "directory" metaphor but it makes the game more playable)

### CHAPTER 1

#### **Home:**

##### Text:

Welcome! If you are new to the game, here are some tips:

Look at your surrounds with the command: `ls` (look at surroundings)

Move to a new location with: `cd [location]` (choose destination)

You can backtrack with the command: `cd ..`

Interact with things in world with: `less [item]` (look at, examine, or speak to something)

Go ahead. Explore. We hope you enjoy what you find.

##### Items:

Letter- which gives the above instructions again when you use the less command (ie less Letter)

#### **WesternForest:**

##### Text:

You enter and travel deep into the forest. Eventually, the path leads to a clearing with a large impressive building. A sign on it reads: Spell Casting Academy: The Elite School of Magic.

##### Items:

Sign- (less Sign) gives text on sign:

Spell Casting Academy: The Elite School of Magic

Today Only: Free Introductory Lessons! Novices welcome!

#### **SpellCastingAcademy:**

##### Text:

The halls are filled the hustle and bustle of academy students scurrying to and from classes. The inside of the academy is as impressive as it is on the outside—with a high ceiling and gothic arches, it seems even larger on the inside.

Items/People:

HurryingStudent- (less HurryingStudent) speaks with student:

You to speak to a hurrying student.

The student runs into you and falls to the ground. The student quickly gets up and apologizes to you, asking if you are okay. You are sturdier than you look and you're undamaged.

"I so sorry, I was in such a hurry that I didn't see you there... Say, I haven't seen you here before. You're new here aren't-cha?" the student winks at you, "Don't worry there's tons of newbies around today, why don't you try checking out one of the free intro lessons they're doing today? I'd show you were to go, but I gotta run to class. Just head into the Lessons hall and someone should help you out. See you 'round."

The student runs past you. You notice that the student is pretty cute, and probably around your age. Unfortunately, the student disappears around a corner before you can ask for a name.

(Note: After interacting with the student, HurryStudent should be removed; this is a one time event)

### **Lessons:**

Text:

You enter the Lessons hall ready and eager. It's much quieter here, as many of the lessons have already started. You quickly ushered into the Introductory Lesson, which already begun.

You enter the class on the "Move Spell."

Items/People:

Professor-(less Professor) listen to the lecture and learn mv command

The professor is difficult to understand, but you pick up just enough to learn 3 things:

1. You can use 'mv' to move things in the world
2. You have to indicate the object and the new location (i.e.: mv [object] [new location])
3. This spell will only work on certain objects, for example the PracticeDummy's in the PracticeRoom

You did not pay enough attention to learn which types of objects are unmovable.

Oh well, experimenting was always more of your style anyways. But be careful!

### **Library:**

Let's get rid of the Library in SpellCastingAcademy, it doesn't do anything useful.

### **PracticeRoom:**

Text:

The room is filled with practice dummies for students to practice their new spells on.

Items:

Instructions: (less Practicedummy)

Welcome to the Practice Room.

Here you will find practice dummies try your new spells on.

Go ahead, give it a go! Practice dummies will respawn in their original location once you leave the Practice Room.

If you don't know any spells yet, go ahead and check out some Lessons.

PracticeDummy1: (less PracticeDummy)

It's a practice dummy.

PracticeDummy2: same as PracticeDummy1

PracticeDummy3: same as PracticeDummy1

PracticeDummy4: same as PracticeDummy1

PracticeDummy5: same as PracticeDummy1

Note 1: When player leaves PracticeRoom (cd..) the PracticeDummy's should reset back into their original locations.

Note 2: If someone tries to 'mv' a PracticeDummy that is no longer in the PracticeRoom, text should give players:

Sorry this practice dummy is not in this room for you to move. If you are trying to move the practice dummy out of the box try using: 'mv Box/[*indicate PracticeDummy#*] .' (the period is important)

### **Box:**

Note 1: This is a directory inside PracticeRoom so that players can try moving PracticeDummies in and out of this Box.

Note 2: This directory should not be accessible by 'cd' an attempt (cd Box) should give text:

The box is too small for you to fit into. Trying "looking" into the box to see what's inside (ls Box).

### **NorthernMeadow:**

#### Text:

This is a beautiful green meadow. A plump but majestic pony prances happily about.

#### Items:

Pony - (less Pony) to ride:

You go up to the pony and attempt to ride it.

It compiles and you ride the pony around in circles for a bit.

It then grows tired of having you as a burden and knocks you off.

He then looks towards the east as if suggesting that you head in that direction.

### **EasternMountains:**

#### Text:

You travel through a mountain path, which eventually leads you to the entrance of a cave.

Sitting right outside this cave is an old man.

Items/People:

OldMan- (less OldMan)

You speak with the old man. He greets you warmly as if you were old friends. You feel at ease with him.

"Hello adventurer! Top of the morning to you!

You seem like a young and energetic explorer.

If you're brave enough, your destiny awaits within this cave.

That destiny will manifest itself as a portal.

Enter this portal and begin the next chapter of your life."

The old man sees the shock on your face and smiles comforting smile,

"I am but a fragile old man, and cannot accompany you through this cave, but what I can provide are a few simple spells that will help you along your way. Just read my old manuscripts and tryout those spells."

OldManuscripts- (less OldManuscripts) teaches 'help' and 'man' commands:

If you ever forget a spell just use 'help' and a list of available spells will appear.

If you need details on how to use a specific spell, use 'man' followed by spell command.

For example, if you were interested in details on how to use the 'mv' spell you would use:

man mv

**Cave:**

Text:

It's your typical cave: dark and dank.

**Staircase:**

Text:

The rocky staircase leads you to a dead end and a sign indicating such.

Items:

Sign- (less Sign)

DEAD END

**DarkCooridor:**

Text:

You travel through the dark corridor and find a small dank room at the end.

**DankRoom:**

Text:

It's a musty dank room. A round boulder sits to the right side of the room.

Items:

Boulder

Note: The player must 'mv Boulder' to somewhere else (ex: mv Boulder SmallHole) in order to reveal the Tunnel. 'less Boulder' will give the player a hint.



(less Boulder)

You feel a slight breeze coming from behind the boulder.

(mv Boulder SmallHole)

You move the boulder aside, reveal the entrance to a tunnel.

Note: Tunnel should be visible using 'ls' after this command is performed.

### **SmallHole:**

#### Text:

It's a hole, there's nothing exciting to do here.

### **Tunnel:**

Note: The Tunnel should not be available in DankRoom until the LargeBoulder has been moved.

#### Text:

It's quite moist in here.

You notice a small furry movement in the corner of your vision.

It's most likely a rat. A very large rat. Perhaps a mongoose.

At the end of the tunnel you find a stone chamber.

#### Items:

Rat- (less Rat)

Upon further inspection, you determine that the furry presence is in fact a rat...the size of a small dog. It bites you. You are very displeased.

### **StoneChamber:**

Text: The whole room glows a dim blue light. The source of this light is a portal standing in the middle of the room. This is obviously the portal of which the old man spoke.

### **Portal:**

Note: If you 'cd Portal' when you are in StoneChamber, you should be brought to the Terminus TownSquare.

## CHAPTER 2

### **TownSquare**

Initial: You are in a sunny and spacious town square. There is a pedestal at the center of the cobblestone turnabout, but no statue on it. The architecture is charming, but everyone here seems nervous for some reason.

-RandomCitizen1

less: "Excuse me," you begin. The man turns, startled. "Oh, hello! Welcome to Terminus. You'll have to forgive me, but we're all a little on edge lately, what with the Dark Wizard spreading corruption all along the coast. You should be careful!"

-RandomCitizen2

less: The man looks up from his newspaper when he notices you staring. "Have

you read this?” he exclaims, shaking the latest edition of “The Last Word” in your face. “It says here the wizard’s corruption has spread as far as Oston to the south, and New Console is completely unrecoverable! These are dangerous times,” he mutters, shaking his head and turning back to his reading.

-DistraughtLady

less: The woman is sobbing uncontrollably, her face in her hands. “My baby,” she cries, “They kidnapped my baby! I just know that wizard had something to do with it.”

## **Library**

Initial: The Library is dimly lit and smells like mildew. Still, it’s warm in here and the soft red carpet makes it seem kind of cozy.

-totallyRadSpellbook

less: Legends speak of a great word of power that allows the speaker to perform any action on any item. “Sudo”, as the ancients called it, conveys complete mastery over the elements. Unfortunately, or perhaps fortunately, the mystical password has been lost to the sands of time.

-paperbackRomance

less: You flip the paperback open to a random page. “Oh, Horatio!” Antonia exclaimed, her bosom heaving as Horatio deftly ripped the bodice from her lithe frame. Horatio gave an animalistic growl and he clasped her fingers in his strong hands and brought them to rest upon his swollen— You close the book, disinterested, and place it back on the shelf.

-historyOfTerminus

less: It looks like an interesting book, but it’s way too long and the print is too tiny.  
grep “dark wizard”:

...old tales tell of a dark wizard who will fragment the land...

...only the world-maker can stop the dark wizard’s virus from...

...that the power of “sudo” may be the dark wizard’s only weakness...

-inconspicuousLever

grep any other phrase: “Grep.” Says Grep, shaking his head with a shrug. He didn’t find anything.

less: You spot an inconspicuous lever behind the shelves. Curious, you pull it, and a panel slides open to reveal a secret back room.

## **BackRoom**

-Grep

less: The exceptionally ugly elf turns to you with a sour expression. “Greeeeeeeep,” he says sullenly.

-Librarian

less:

(before completing grep quest) “Hm? Oh, hello. I apologize for the mess, but I’m very busy doing research on the dark wizard. Would you do me a favor? Go look up all references to “dark wizard” in the History of Terminus. My assistant Grep can help you.” Grep eyes you balefully. “Greeepp.”

“To search the contents of the book, just type “grep [phrase] [document]”, where [phrase] is the phrase you want to search for in quotation marks, and [document] is the name of the book you want to search.”

(after completing grep quest) “Thank you, you’ve been most helpful! Here, take this for your troubles. It’s the least I can do.” The librarian hands you 5 gold pieces.

### **Marketplace**

Initial: It seems like Terminus has fallen on hard times; there’s only one stall in the marketplace. A sleazy-looking vendor lounges behind a table piled with strange wares.

-Vendor

less: “ ‘Ello there.” The vendor smiles at you unpleasantly, revealing a mouth full of gold teeth. “Well? Wot are you looking for?”

rm: “Ha! That spell doesn’t work on everything, you know. I may have forgotten to mention that before I sold it to you...”

-backpack

less: There’s a beat-up looking backpack on the table with no price tag. Its cloth looks frayed, but sturdy. You glance quickly at the vendor, but his attention is elsewhere.

Do you take the backpack? y/n

If y: print “You quickly snatch the backpack from the table. This could come in handy. From now on, you can say ‘mv <item> backpack’ to put items into your backpack.”

If n: You decide to leave the backpack where it is for now.

\*If y, then you gain the ability to carry items in the backpack

-rmSpell

less: There’s a spell scroll on the table labeled “Remove.” Do you want to buy it for 15 gold pieces? y/n

If y (and not enough money): You don’t have enough money to buy the Remove spell.

If y (and enough money): The vendor snatches the gold from your hand and then hands you the scroll, leering as he does so. “Ah, yes, the rm spell,” he muses. “Simply say ‘rm’ followed by the name of an item or person, and they will disappear from this plane...

forever. D’you have the guts to use it, I wonder?” You can now use the “rm” spell.

If n: You leave the rmSpell on the table.

-mkdirSpell

less: There’s a spell scroll on the table labeled “Make dreams into reality.” Do you want to buy it for 30 gold pieces? y/n

If y (and not enough money): You don’t have enough money to buy the Mkdir spell.

If y (and enough money): The vendor cackles. “An ambitious one, eh? Very well. Just say ‘mkdir’ followed by any name that pleases you, and you can create a new place wot never existed there before. Ha! Not very useful, if y’ask me...” you can now use the “mkdir” spell.

If n: You leave the mkdirSpell on the table.

## ArtisansShop

Initial: The walls of the shop are covered in clocks, all slightly out of sync. At the workbench, a woman in an enormous pair of goggles is wielding a blowtorch with frightening enthusiasm.

-strangeTrinket

less: It looks like a crystal of some sort. It's very beautiful.

rm: Didn't your mother ever teach you that it's rude to erase other people's things from their plane of existence?

mv: You can't take that, it's not yours!

-clockworkDragon

less: An adorable dragon the size of a small dog is frolicking about the room. You'd think it was real if it weren't for the wind-up key sticking out of its back.

rm: Didn't your mother ever teach you that it's rude to erase other people's things from their plane of existence?

mv: You can't take that, it's not yours!

-Artisan

less:

(first time talking to Artisan) The Artisan lifts up her goggles and peers at you in surprise. "Are you the new assistant? You're late! ....You say you aren't my assistant? Well, that doesn't mean you can't make yourself useful. I need some gears, quickly!

...

You don't even know how to make things? Hmph. Some assistant you are. Just say "nano [item]" alright? Where [item] is the name of the thing you want to create. Now make me a Gear!"

(after making 1 gear) "Well that's lovely, thank you, but you can't expect me to make anything with just one gear! Can't you copy it?

...

\*sigh\* I can see you are going to need a lot of training. Just say "cp [item] [newitem]". [Item]'s the name of the item that you want copy, and [newitem]'s the new name of the copy, got it? Then poof! You'll have shiny new item. I need five more gears so you'd better get started! Just call them gear1, gear2, gear3, gear4, and gear5, please."

(after making all gears) "Ha, finished already? I guess you learn fast. Well, thanks for your assistance. Take this." The Artisan hands you 10 gold pieces.

## RockyPath

Initial:

(while boulder still there) The weed-choked path leads off into the fields. There is an enormous boulder blocking your way, however.

(after boulder removed) The weed-choked path leads off into the fields.

-largeBoulder

less: It's much too big to move.

rm: The boulder disappears with a pop. The way is clear now.

### **Farm**

Initial: There was once a farm of some sort here, but now the fields are scorched and brown.

-earOfCorn

less: The corn is sad and withered-looking.

rm: Why would you destroy a starving man's only food?

-Farmer

less:

(before quest completed) "Ruined! I'm ruined! Look at these crops... almost nothing left! The wizard's minions were here last week... they destroyed everything. How will I feed my 10 children with just one ear of corn?"

(after corn copied 9 times) "It's a miracle! Thank you, friend. Take these 30 gold pieces as a token of my gratitude, and may the Admin bless you."

### **BrokenBridge**

Initial:

(before solved) A creaky wooden bridges stretches across a chasm. But it's missing a plank, and the gap is too far to jump.

(after) A creaky rope bridges stretches across a chasm.

cd Clearing (before solved): You can't cross the bridge until you've replaced the missing Plank.

### **Clearing**

Initial: (before solved) There's a small grassy clearing here, with a man sitting on a stone and sobbing. Behind him is a pile of rubble.

(after solved) There's a small grassy clearing here, with a man sitting on a stone and sobbing. Behind him is a small white house.

-cryingMan

less:

(before solved) "You! You're a magic-user! I can tell, you've got that look. Come to finish the job, have you? Well, go ahead, do your worst— there's nothing else you can take from me. Not since the rest of you were here a few days ago.

...

What happened? You DARE to ask— you know perfectly well what happened. Your friends, the wizard's minions, destroyed my house and kidnapped my poor daughter, that's what! My wife even went into town to look for help, and I haven't heard from her since!

...

Hm? Well, I guess it's true that you don't look like one of the wizard's minions. Still, I don't trust you magicfolk. If you really are who you say you are, then prove your good intentions by making me a new House!"

(after you mkdir House) "Maybe you aren't so bad after all. If you really want to help,

though, you'll go save my daughter! They took her that way, down that ominous-looking path. I heard one of them mutter the word 'brambles\_b\_gone' as they were leaving. It doesn't mean anything to me, but maybe it will help you on your journey."  
(after he's given you the password) "Be careful."

### **OminousLookingPath**

Initial: The path leads toward a dark cave. It's an ordinary cobblestone path, but for some reason it fills you with a sense of dread.

-thornyBrambles

less: This thicket of brambles is covered with wicked-looking thorns. You can't go around it, and you definitely aren't about to go through it.

mv: You can't touch them because they are covered with thorns. Ouch!

rm: You speak the words of the Remove spell and the brambles glimmer a deep blue. They seem to be protected by a password.

<prompt for password>

if correct(brambles\_b\_gone): The brambles catch fire, choking you with a thick black smoke. When the smoke clears, they're gone.

If incorrect: Red sparks arc across the brambles before fizzling out. They are definitely still there. Nice try though.

-cd Cave (before brambles have been removed): A patch of thorny brambles is growing at the mouth of the cave, blocking your way.

### **CaveOfDisgruntledTrolls**

Initial: The cave is dark and smells like... feet? Oh, right, it's probably the trolls. There's a scared-looking kid in a cage by the far wall.

-uglyTroll

less: He looks mad, and really ugly.

rm: The troll looks briefly surprised, then vanishes with an unpleasant squelching sound.

-uglierTroll

less: He looks mad, and really, really ugly.

rm: The troll looks briefly surprised, then vanishes with an unpleasant squelching sound.

-absolutelyHideousTroll

less: You probably don't want to look at this guy. Trust me on this one.

rm: The troll belches spectacularly, and you could swear he actually smirks. You won't get rid of him that easily, not without admin privileges.

mv:

(anywhere besides the cage) If you move him out of the cave, he'll terrorize the countryside. Also he will probably eat you.

(cage while kid is still inside) The troll vanishes with a pop and reappears inside of the cage. He scowls and then begins to chew on the kidnapped child's leg.

(cage once kids has been moved out) The troll vanishes with a pop and reappears inside of the cage. He scowls and roars.

-cd Cage: You can't squeeze through the bars. Anyway, are you crazy? Why would you want to go into a cage?

### **Cage**

Is: There's a scared-looking kid in there.

-kidnappedChild

less: You know it's kind of mean, but you can't help but think that that is one funny-looking kid.

mv: The kid looks around, dazed, surprised to find himself out of the cage. You smile at him and speak in a gentle voice. "You should probably be getting home, little boy. Someone is there waiting for you."

"I'm a girl," says the little girl smartly. Then she dashes past you, out of the cave, and runs up the ominous path towards home.