PunyInform

An Inform library for writing small and fast text adventures.

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Introduction

PunyInform is a library written in Inform which allows people to create text adventures/interactive fiction using the Z-machine virtual machine.

The main goal of PunyInform is to allow for games which are fast and

have a small memory footprint. This should make the games run well on older architectures, such as the 8 bit computers of the 1980s. Our main target is to make it suitable for games on the Commodore 64 using Ozmoo (https://github.com/johanberntsson/ozmoo)

PunyInform is based on the Inform 6 standard library, developed by Graham Nelson. In this document DM4 refers to the *Inform Designer's Manual, version 4*, which is availble online at: http://www.inform-fiction.org/manual/html/index.html

A PunyInform game can be compiled to z3, z5 or z8, but lacks support for Glulx. To compile games using PunyInform, we recommend the official Inform 6 compiler maintained by David Kinder, at https://github.com/DavidKinder/Inform6 . We are using version 6.33 for all development work. Newer versions are highly likely to work fine as well.

We want to thank these people for supporting the development of PunyInform

- Graham Nelson: for giving his blessing to our project and the use of the PunyInform name
- David Kinder and Andrew Plotkin: for improving z3 support in Inform
- Pablo Martínez: for patches and making the first full-size game in PunyInform
- Tomas Öberg: for patches and encouragement

Comparison with the Inform Standard Library

A game written in PunyInform is very similar to a game written with the Inform standard library with the exception of which files to include and where to place code that customize the library. However, there are some major changes that are documented in this section.

Getting Started

You can use the minimal.inf file, supplied with PunyInform, as a starting point for developing a new game.

The general pattern of a PunyInform game is:

```
! define library globals here

Include "globals.h";

! add extension routines and other library customizations here

Include "puny.h";

! add normal game code here
```

```
[Initialise;
];
```

The library variables Story, Headline, MAX_SCORE, NUMBER_TASKS, TASKS_PROVIDED, AMUSING_PROVIDED, MAX_CARRIED, and SACK_OBJECT should be defined before including globals.h, if needed. These variables are documented in DM4.

Library customization, such as supplying a library extension point like PrintTask, goes between the globals.h and puny.h inclusions.

After the includes you add game code and an Initialise routine, as in other Inform games.

Articles

PunyInform, unlike the Inform standard library, will not figure out when it should be article "an". You need to specify it using the article property every time it should be "an". Example:

```
Object Umbrella "umbrella"
    with
        name 'umbrella',
        article "an";
```

Another difference is that PunyInform doesn't support the articles (note the s) property. This was only added to the Inform library because it's useful for some languages other than English.

Daemons and timers

Property daemon is an alias for property time_out. This means you can't have a daemon and a timer on the same object. If you want both, put one of them in another object, possibly a dummy object whose only purpose is to hold the timer/daemon.

Library Messages and Customization

All system messages that can be replaced can be found in the file messages.h.

PunyInform uses two form of library messages: static strings and complex messages. A typical static string is "Taken.". If a message has parts that vary, if the same message should be shared by several different message identifiers, or a newline should NOT be printed after the message, the message needs to be a complex message. A complex message has its own piece of code to print it.

Each message is defined as either a static string or a complex message in messages.h. If you want to replace a message, you can choose to replace it with

a static string or a complex message, regardless of its type in messages.h. You do this by defining constants and possible a LibraryMessages routine before the inclusion of puny.h.

To replace a message with a static string, define a constant with the same name as the message identifier and give it a string value, i.e:

```
Constant MSG_INSERT_NO_ROOM "It's kinda full already, I'm afraid.";
```

To replace a message with a complex message, define a constant with the same name as the message identifier, give it a value >= 1000 and provide a LibraryMessages routine to handle it, i.e:

```
Constant MSG_EXAMINE_NOTHING_SPECIAL 1001;

[LibraryMessages p_msg p_arg_1;
    switch(p_msg) {
    MSG_EXAMINE_NOTHING_SPECIAL:
        print (The) noun, " looks perfectly normal in every way.";
        rtrue;
    }
    rfalse;
];
```

The LibraryMessages routine takes two arguments - a message identifier (p_msg) and an optional argument which a few messages use (p_arg_1). Make sure the routine returns true after printing a message, and false if it didn't print anything.

Direction Handling

The Compass and the twelve direction objects, as described in DM4, are not available in PunyInform. Instead, there is a single object called Directions and two global variables called selected_direction and selected_direction_index. When compiling games for the z3 format, a game can have a maximum of 255 objects. With this in mind, it's good to use a single object for directions instead of 13 objects.

Whenever the player has typed a direction, noun is Directions and selected_direction contains the property number for the direction the player typed. If the player didn't type a direction, these variables will be 0. The name of the Direction object is always the currently selected direction, or "unknown direction" if no direction is selected. So, to implement a robot which will stop the player from going north or east, one might write a react_before routine like this:

```
Object Robot "Floyd"
    with
        react_before [;
            Go:
```

```
                if(selected_direction == n_to or e_to)
                    "~My mother always told me to avoid going ", (name) Directions, ".~, say
        ],
    has animate;
```

selected_direction_index is something you will probably use less often, but it can nevertheless be useful in some cases. You can use it to look up the dictionary words which can be used to refer to that direction, the property number and the name of the direction:

```
print (address) abbr_direction_array-->selected_direction_index; ! prints the short dictiona
print (address) full_direction_array-->selected_direction_index; ! prints the long dictionar
print direction_properties_array-->selected_direction_index; ! prints the property number, I
print (string) direction_name_array-->selected_direction_index; ! prints the direction name,
```

Each of these arrays is a table, so all of them have the number of directions as element 0. This is useful if you're writing a library extension and want to iterate over all directions in a safe manner.

Fake direction objects.

For each direction, there is also a fake direction object: FAKE_N_OBJ, FAKE_SW_OBJ, FAKE_OUT_OBJ etc. If you need to generate an action in code which has a direction in it, this requires using the corresponding fake direction object, like this:

```
<<Go FAKE_N_OBJ>>;
<<Push Stone FAKE_NW_OBJ>>;
```

If you want to go in a direction and you know the property number for that direction, you can find the corresponding fake direction object by subtracting n_to from the value and adding FAKE_N_OBJ, like this:

```
dir_prop = ne_to; ! Or any direction you like
fake_obj = dir_prop - n_to + FAKE_N_OBJ; ! Note: n_to and FAKE_N_OBJ are part of the forumla
<<Go fake_obj>>;
```

Each fake direction object is just a constant. PunyInform recognizes these constants and sets selected_direction and selected_direction_index properly. This is, as far as we can tell, the only use for the fake direction objects.

Darkness

PunyInform uses a simplified concept of darkness. Instead of putting the player in a special TheDark object when in darkness and keeping real_location updated, as described in DM4, PunyInform keeps a global variable "darkness" and updates the scope accordingly.

A game using PunyInform should check "darkness" to see if there is light.

Scoring

Scoring works as in DM4 with the exception of the scored attribute, which isn't supported. Because of this the OBJECT_SCORE library variable isn't used.

Box Statements and Menus

The box statement is not available in version 3 games, and the usual menu extensions will not work either since version 3 games lack cursor control commands. Instead PunyInform provides extensions that approximate this functionality. See the Extensions section for more detail and how to enable these routines.

Parser

The parser is to a large extent compatible with Inform, for example wn, NextWord() and NextWordStopped() are implemented, and noun/second/inp1/inp2/special_number/parsed_number work the same.

General parse routines are supported with the exception of GRP_REPARSE which isn't supported. The reason for this is that version 3 games cannot retokenise the input from the reconstructed string.

Programming Advice

The Inform standard veneer routine for printing informative messages for all sorts of runtime errors that can occur is replaced with a simpler routine in PunyInform, saving about 1.5 KB. However, the original routine is used when at least one of the constants DEBUG or RUNTIME_ERRORS is defined.

Customizing the library

PunyInform is designed to be as small as possible to run well on old computers, and some features that add to the size have made optional. If you want to enable these features, add a line like "Constant OPTIONAL_GUESS_MISSING_NOUN;" before including globals.h, but keep in mind that it will make the game larger.

The optional parts of PunyLib can be enabled with these constants:

Option	Size	Comment
OPTIONAL_ALLOW_WRITTEN_NUMBERS		to be able to parse "one", "two" etc as numbers.

Option	Size	Comment
OPTIONAL_DEBUG_VERBS		enable some debugging verbs for game development. These include 'scope', 'random' and 'pronouns'.
OPTIONAL_EXTENDED_VERBSET		add a set of less important, but nice to have, verbs in the grammar.
OPTIONAL_GUESS_MISSING_NOUN	512 bytes	add code to guess missing parts of an incomplete input, such as a door when typing only 'open', and accepting the input with a "(assuming the wooden door)" message.

Please note that if you compile your game in DEBUG mode with the -D switch to the Inform compiler, then OPTIONAL_DEBUG_VERBS are automatically enabled. But to have access to debug verbs in release mode you need to define OPTIONAL_DEBUG_VERBS manually in your game.

PunyInform can also use a set of standard abbreviations to make strings more compact. If you want to provide your own abbreviations, define the constant CUSTOM_ABBREVIATIONS in your game. Keep in mind that you need to compile with the "-e" flag to make the compiler use abbreviations.

Limitations for z3

If you want to compile a game to z3 format, this is what you need to keep in mind:

- A game can use no more than 32 attributes and 30 common properties. PunyInform defines 28 attributes and 29 common properties.
- Arrays in common properties can only hold four values. Arrays in individual properties however, can hold 32 values.
- When using message passing (like "MyBox.AddWeight(5)"), no more than one argument may be passed. (In regular Inform, message passing doesn't work at all in z3.)
- Dynamic object creation and deletion can not be used.
- If you need more than four names for an object in a z3 game, give it a parse_name routine.

When the player is inside an object, in a z5 game, the library will print the name of the object on the statusline, in definite form ("The box"). In a z3 game, the object name string will be printed as-is, typicall like "box". This behavior in z3 games is part of the Z-machine specification. If you want a z3 game to print a different name for when the player is inside the object, you can set the object name string to the desired name, and override it with short_name for all other uses, like this:

```
Object box "The box"
 with short_name "box"
 has container openable enterable;
```

Properties

A property can be used to store a 16-bit value, or an array of values. In z5, a property array can hold up to 32 values. In z3, a property array can only hold 4 values if it is in a common property but 32 values if it is in an individual property.

If a property is declared as additive, the values for an object are concatenated with the values of its class, if any, and put into an array.

A property can either be common or individual. Common properties are a little faster to access and use a little less memory than individual properties. A z5 or z8 game can use a maximum of 62 common properties, while a z3 game can use a maximum of 30 common properties. PunyInform uses 29 common properties, so if you're building a z3 game, you can only add a single common property. The value of a common property can always be read, but it can only be written if it has been included in the object declaration. If you don't include it, there is no memory allocated to store a value. If you read the value of such a property, you just get the default value (typically 0).

A common property is created by declaring it with

Property *propertyname*;

To access a property, you write object._propertyname_, like this:

Dog.description = "The dog looks sleepy.";

To check if an object has a value for a property (to see if it can be written if it is a common property or to see if it can be read or written if it is an individual property, use *provides*:

If(Dog provides description) ...

List of Routines

PunyInform defines both public and private routines. The private routines are prefixed with an underscore (for example, _ParsePattern) and should not be

used by a game developer. The public routines do not have this prefix, and are for general use. Most of the public routines are same, or very similar, to corresponding routines in DM4, but PunyInform also offers a few extra routines not available in Inform. All public routines are listed below in this section.

Library Routines

These library routines are supported by PunyInform, as described in DM4.

Library Routine	Comment
CommonAncestor	
DrawStatusLine	Not available in version 3 games
IndirectlyContains	
InScope	
LoopOverScope	
NextWord	
NextWordStopped	
NumberWord	
ObjectIsUntouchable	
PlayerTo	
ParseToken	
PlaceInScope	
PronounNotice	
ScopeWithin	
TestScope	
TryNumber	
WordAddress	
WordLength	
YesOrNo	

Library Entry Routines

This library entry routines are supported by PunyInform, as described in the DM4.

Entry Routine	Comment
AfterLife	
AfterPrompt	
Amusing	
BeforeParsing	
DarkToDark	
DeathMessage	
GamePostRoutine	
GamePreRoutine	

Entry Routine	Comment
InScope	The et_flag isn't supported.
LookRoutine	
NewRoom	
ParseNumber	
PrintTaskName	
PrintVerb	
TimePasses	
UnknownVerb	

These library entry routines are not supported

Entry Routine	Comment
ChooseObjects	The parser internals differ too much
ParserError	The parser internals differ too much

Additional Public Routines

Routine Name	Comment
PrintOrRun	
RunRoutines	
CTheyreorThats	
ItorThem	Print directive
IsOrAre	Print directive

PunyInform Public Routines

Routine Name	Comment
OnOff	Print directive
ObjectIsInvisible	Similar to ObjectIsUntouchalbe (DM4)
PrintMsg	
RunTimeError	

List of Properties

These are the properties defined by the library:

Property	Comment
add_to_scope	

Property	Comment
after	
article	
before	
cant_go	
capacity	
d_to	
daemon	
describe	
description	
door_dir	
e_to	
found_in	
grammar	
in_to	
initial	
inside_description	
invent	
life	
list_together	
n_to	
name	
ne_to	
number	
nw_to	
orders	
out_to	
parse_name	
plural	
react_after	
s_to	
se_to	
short_name_indef	
short_name	
sw_to	
time_left	
u_to	
w_to	
when_closed	
when_open	
with_key	

List of Variables

These variables are the same as in DM4.

Variable	Comment
action	
actor	
articles	
consult_from	
consult_words	
deadflag	
herobj	
himobj	
inp1	
inp2	
itobj	
keep_silent	
location	
lookmode	
parsed_number	
parser_action	
scope_stage	
score	
second	
special_number	
verb_word	
verb_wordnum	
wn	

These variables are PunyInform only.

Variable	Comment
darkness	

These variables are used in the Inform standard library and are listed in DM4, but are not used in PunyInform.

Variable	Comment
c_style	
et_flag	
inventory_stage	
listing_together	
lm_n	

Variable	Comment
lm_o	
notify_mode	
parser_one	
parser_two	
read_location	
scope_reason	
standard_interpreter	
the_time	
vague_object	

List of Attributes

These attributes are the same as in DM4.

Attribute	Comment
absent	
animate	
clothing	
concealed	
container	
door	
edible	
enterable	
female	
general	
light	
lockable	
moved	
neuter	
on	
open	
openable	
pluralname	
proper	
scenery	
static	
supporter	
talkable	
transparent	
visited	
workflag	
worn	

These attributes are used in the Inform standard library and are listed in DM4, but are not used in PunyInform.

Attribute	Comment
male	not needed, assumed if not female or neuter
scored	

List of Constants

These constants are the same as in DM4.

Constant Name	Comment
AMUSING_PROVIDED	
GPR_FAIL	
GPR_MULTIPLE	
GPR_NUMBER	
GPR_PREPOSITION	
GPR_REPARSE	
Headline	
MAX_CARRIED	
MAX_SCORE	
MAX_TIMERS	
NUMBER_TASKS	
SACK_OBJECT	
Story	
TASKS_PROVIDED	

These attributes are used in the Inform standard library and are listed in DM4, but are not used in PunyInform. Most of them are parser specific for the standard lib, and the PunyInform parser works differently.

Constant Name	Comment
ANIMA_PE	
ASKSCOPE_PE	
CANTSEE_PE	
DEATH_MENTION_UNDO	
EACHTURN_REASON	
ELEMENTARY_TT	
EXCEPT_PE	
ITGONE_PE	
JUNKAFTER_PE	
LOOPOVERSCOPE_REASON	

Constant Name	Comment
MMULTI_PE	
MULTI_PE	
NO_PLACES	
NOTHELD_PE	
NOTHING_PE	
NUMBER_PE	
OBJECT_SCORE	
PARSING_REASON	
REACT_AFTER_REASON	
REACT_BEFORE_REASON	
ROOM_SCORE	
SCENERY_PE	
SCOPE_TT	
STUCK_PE	
TALKING_REASON	
TESTSCOPE_REASON	
TOOFEW_PE	
TOOLIT_PE	
UPTO_PE	
USE_MODULES	
VAGUE_PE	
VERB_PE	

Grammar

Here are the standard verbs defined in the library. Verbs that have the "extended" comment are not included by default, but can be added by defining OPTIONAL_EXTENDED_VERBSET.

Verbs	Comment
answer say shout speak	-
ask	-
attack break crack destroy	-
blow	extended
bother curses darn drat	extended
burn light	extended, not in PunyInform
buy purchase	extended, not in PunyInform
climb scale	-
close cover shut	-
consult	extended, not in PunyInform
cut chop prune slice	-
dig	-

Verbs	Comment
drink sip swallow	-
drop discard throw	-
eat	-
empty	extended, not in PunyInform
enter cross	-
examine x	-
exit out outside	-
fill	-
get	-
give feed offer pay	-
go run walk	-
in inside	extended, not in PunyInform
insert	-
inventory inv i	-
jump hop skip	-
kiss embrace hug	-
leave	-
listen hear	-
lock	-
look l	-
no	extended, not in PunyInform
open uncover undo unwrap	-
peel	extended, not in PunyInform
pick	-, not in PunyInform
pray	extended, not in PunyInform
pry prise prize lever jemmy force	extended, not in PunyInform
pull drag	-
push clear move press shift	-
put	-
read	-
remove	-
rub clean dust polish scrub	-
search	-
set adjust	extended, not in PunyInform
shed disrobe doff	-, not in PunyInform
show display present	-
shit damn fuck sod	extended
sing	extended, not in PunyInform
sit lie	-, not in PunyInform
sleep nap	extended, not in PunyInform
smell sniff	-
sorry	extended, not in PunyInform
squeeze squash	extended, not in PunyInform
stand	-

Verbs	Comment
swim dive	-, not in PunyInform
swing	extended, not in PunyInform
switch	-
take carry hold	-
taste	- not in PunyInform
tell	-
think	extended, not in PunyInform
tie attach fasten fix	- not in PunyInform
touch feel fondle grope	-
transfer	extended, not in PunyInform
turn rotate screw twist unscrew	-
wave	extended, not in PunyInform
wear don	-
yes y	extended, not in PunyInform
unlock	-
wait z	- not in PunyInform
wake awake awaken	extended

These are the meta verbs defined in the library.

Verbs	Comment
brief normal	
verbose long	
superbrief short	
notify	not in PunyInform
pronouns nouns	OPTIONAL_DEBUG_VERBS
quit q die	
recording	not in PunyInform
replay	not in PunyInform
restart	
restore	
save	
score	
fullscore full	
script transcript	not in PunyInform
noscript unscript	not in PunyInform
verify	not in PunyInform
version	
objects	not in PunyInform
places	not in PunyInform

These are the debug verbs defined in the library.

Verbs	Comment
abstract	not in PunyInform
actions	not in PunyInform
changes	not in PunyInform
gonear	not in PunyInform
goto	not in PunyInform
purloin	not in PunyInform
random	OPTIONAL_DEBUG_VERBS
routines messages	not in PunyInform
scope	OPTIONAL_DEBUG_VERBS
showobj	not in PunyInform
showverb	not in PunyInform
timers daemons	not in PunyInform
trace	not in PunyInform
tree	not in PunyInform

Extensions

flags

Flags is a mechanism for keeping track of story progression. If you choose to use flags, four procedures with a total size of about 165 bytes are added to the story file. Also, an eight byte array is added to dynamic memory, plus one byte for every eight flags. All in all this is a very efficient way of keeping track of progress.

If you want to use flags, after including globals.h, set the constant FLAG_COUNT to the number of flags you need, and then include ext_flags.h.

You then specify a constant for each flag, like this:

```
Constant F_FED_PARROT 0; ! Has the parrot been fed?
Constant F_TICKET_OK 1; ! Has Hildegard booked her plane tickets?
Constant F_SAVED_CAT 2; ! Has the player saved the cat in the tree?
```

You get the idea – you give each flag a symbolic name so it's somewhat obvious what it does. Note that the first flag is flag #0, not flag #1.

Setting a flag on or off means calling the routing SetFlag(flag#) or ClearFlag(flag#)

To indicate that the player has saved the cat, call SetFlag(F_SAVED_CAT), and to turn off that flag, call ClearFlag(F_SAVED_CAT).

Testing a flag is accomplished by calling FlagIsSet or FlagIsClear. So if you have a piece of code that should only be run if the parrot has been fed, you would enclose it in an if(FlagIsSet(F_FED_PARROT)) { ... }; statement.

Naturally, you can test if a flag is clear by calling FlagIsClear instead.

cheap_scenery

This library extension provides a way to implement simple scenery objects which can only be examined, using just a single object for the entire game. This helps keep both the object count and the dynamic memory usage down. For z3 games, which can only hold a total of 255 objects, this is even more important. To use it, include ext_cheap_scenery.h after globals.h. Then add a property called cheap_scenery to the locations where you want to add cheap scenery objects. You can add up to ten cheap scenery objects to one location in this way. For each scenery object, specify, in this order, one adjective, one noun, and one description string or a routine to print one. Instead of an adjective, you may give a synonym to the noun. If no adjective or synonym is needed, use the value 1 in that position.

Note: If you want to use this library extension in a Z-code version 3 game, you must NOT declare cheap_scenery as a common property, or it will only be able to hold one scenery object instead of ten. For z5 and z8, you can declare it as a common property if you like, or let it be an individual property.

If you want to use the same description for a scenery object in several locations, declare a constant to hold that string, and refer to the constant in each location.

Before including this extension, you can also define a string or routine called SceneryReply. If you do, it will be used whenever the player does something to a scenery object other than examining it. If it is a string, it is printed. If it is a routine it is called. If the routine prints something, it should return true, otherwise false.

If constant DEBUG is defined, the extension will complain about programming mistakes it finds in the cheap_scenery data in rooms. Without DEBUG, it will keep silent.

Example usage:

```
[SceneryReply;
Push:
    "Now how would you do that?";
default:
    rfalse;
];

Include "ext_cheap_scenery.h";

Constant SCN_WATER = "The water is so beautiful this time of year, all clear and glittering

[SCN_SUN;
   deadflag = 1;
```

```
   "As you stare right into the sun, you feel a burning sensation in your eyes.
   After a while, all goes black. With no eyesight, you have little hope of
   completing your investigations.";
];

Object RiverBank "River Bank"
    with
        description "The river is quite wide here. The sun reflects in the blue water, the b
                     flying high up above.",
        cheap_scenery
            'blue' 'water' SCN_WATER
            'bird' 'birds' "They seem so careless."
            1 'sun' SCN_SUN,
    has light;
```