PunyInform

PunyInform

An Inform library for writing small and fast text adventures.

Version 4.1, 19 November 2022

Contents

Introduction

PunyInform is a library written in Inform 6 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, 4th edition*, which is availble online at: http://www.inform-fiction.org/manual/html/index.html

A PunyInform game can be compiled to Z-code version 3, 5 or 8 (z3, z5 or z8), but not Glulx. To compile games using PunyInform, you need the official Inform compiler maintained by David Kinder, at https://github.com/DavidKinder/Inform6. Binaries can be found at if-archive. Please note that PunyInform uses features that were introduced in Inform v6.36 and using earlier versions of the compiler will cause errors.

Comparison with the Inform 6 Standard Library

A game written in PunyInform is very similar to a game written with the Inform 6 standard library. However, there are some major differences that are documented in this section.

Getting Started

To compile a game, unpack the files, place the Inform 6 compiler binary (Get the source or an executable at http://www.ifarchive.org/indexes/if-archiveXinfocomXcompilersXinform6.html) in the base directory, and type e.g. `inform6 +lib -v3 -s -e library_of_horror.inf` (type `inform6 -h2` for an explanation of all commandline switches). PunyInform requires at least version v6.36 of the compiler, and v6.40 is the recommended version.

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:

```
Constant INITIAL_LOCATION_VALUE = ...;

! Change "score" to "time" if you want time on the statusline
Constant STATUSLINE_SCORE; Statusline score;

! define library constants here

Include "globals.h";

! define your own global variables here

! add extension routines and other library customizations here

Include "puny.h";
```

```
    ! add normal game code here

    [Initialise;
      "Welcome to the game!";
    ];
```

All library constants, including `Story, Headline, MAX_SCORE, OBJECT_SCORE,`
`ROOM_SCORE, NUMBER_TASKS, TASKS_PROVIDED, AMUSING_PROVIDED,`
`MAX_CARRIED` and `SACK_OBJECT` should be defined before including glob-
als.h, if needed. The roles of these constants are documented in DM4.

Library customization, such as supplying an entry point routine such as
`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.

Actions

PunyInform has most of the actions that the standard library has, but they
are divided into four sets. The basic set of actions is part of the core library.
Then there is a set of normal actions which can be enabled by defining the
constant OPTIONAL_EXTENDED_VERBSET and a set of meta actions
which can be enabled by defining OPTIONAL_EXTENDED_METAVERBS.
OPTIONAL_PROVIDE_UNDO provides the undo verb (z5 and z8 only).
Finally, just as in the standard library, there is a set of debug verbs, which can
be enabled by defining the symbol DEBUG.

The basic actions

Normal actions: Answer, Ask, AskTo, AskFor, Attack, Close, Consult, Cut, Dig,
Disrobe, Drink, Drop, Eat, Enter, Examine, Exit, Fill, GetOff, Give, Go, Inv,
Insert, Jump, JumpOver, Listen, Lock, Look, Open, Pull, Push, PushDir, PutOn,
Remove, Rub, Search, **Shout** , *ShoutAt* , Show, Smell, SwitchOff, SwitchOn,
Take, Tie, Tell, ThrowAt, Touch, Transfer, Turn, Unlock, Wait, Wear.

Meta actions: Again, FullScore, LookModeNormal, LookModeLong, Look-
ModeShort, NotifyOn, NotifyOff, Oops, OopsCorrection, Quit, Restart, Restore,
Save, Score, Version.

[*] The Shout action is not present in the standard library. Shout is triggered
if the player types "shout", "scream" or "yell", or "shout hello sailor" (with
`consult_from` and `consult_words` pointing out the words the player wants to
shout, or 0 if no words were given.)

[*] The ShoutAt action is not present in the standard library. ShoutAt is triggered
if the player types "shout at postman".

OPTIONAL_EXTENDED_VERBSET actions

Normal actions: Blow, Burn, Buy, Empty, EmptyT, GoIn, Kiss, Mild, No, Pray, Set, SetTo, Sing, Sleep, Sorry, Strong, Squeeze, Swim, Swing, Taste, Think, Wake, WakeOther, Wave, WaveHands, Yes.

OPTIONAL_EXTENDED_METAVERBS actions

Meta actions: CommandsOn, CommandsOff, CommandsRead, Places, Objects, ScriptOn, ScriptOff, Verify.

Note: Places and Objects can be disabled by defining the constant NO_PLACES.

DEBUG actions

Meta actions: ActionsOn, ActionsOff, GoNear, Pronouns, Purloin, RandomSeed, RoutinesOn, RoutinesOff, Scope, TimersOn, TimersOff, Tree.

UNDO

Defining OPTIONAL_PROVIDE_UNDO activates the 'undo' command, which can be used on interpreters that support undo. This will also make the library mention undo as an option if the player dies/loses. If DEATH_MENTION_UNDO is defined, the option to use undo is always mentioned when the game ends, even if the player has won. Note that undo is not supported in z3 games.

Implicit actions

PunyInform has two routines for performing implicit actions:

- `ImplicitGrabIfNotHeld(object)` - Take something if it isn't already held by the player.
- `ImplicitDisrobeIfWorn(object)` - Take off something if it is currently worn by the player.

An action routine which wants to have the player take an item, e.g. `noun` will typically do this somewhere near the start of the action routine:

```
if(ImplicitGrabIfNotHeld(noun)) rtrue;
```

If, at the end of the `ImplicitGrabIfNotHeld` routine, the item is held by the player, the routine returns false, otherwise true. If it returns true, a message has also been printed. It's also legal to call this routine with a parameter value of 0, in which case it always returns false.

To take off an item if it's worn, use the `ImplicitDisrobeIfWorn` routine, which functions in much the same way.

The game can turn off all implicit actions by setting `no_implicit_actions = true`.

Moving objects

If you move an object into the player's possession in your own code, like `move Screwdriver to player;`, you should always do `update_moved = true;`. This is necessary to have PunyInform update the `moved` attribute and, when applicable, score points for the object being picked up. If you issue a ##Take action or some action that does an implicit take, you don't need to bother with this.

If you have defined `OPTIONAL_MANUAL_SCOPE` and you do something in code which may affect scope (Essentially what the player can see), you need to do `scope_modified = true;`. As a rule of thumb, do this whenever you move an object using `move` or `remove` or you give or remove any of the attributes `open`, `transparent` and `light` for an object. Library routines like PlayerTo and all action routines do this when needed.

Animate objects

If you want to allow the player to take certain animate objects, you can add an entry point routine called DisallowTakeAnimate and have it return false if noun is one of those objects. I.e:

```
[ DisallowTakeAnimate;
    if (noun ofclass Puppy) rfalse;
];
```

Articles

PunyInform, unlike the Inform standard library, will not figure out when an object should have the indefinite 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.

Plural

PunyInform can handle a collection of objects as long as they can be described with full names, but it does not offer support for indistinguishable objects. The library supports `pluralname` and the plural marking on dictionary words with the `//p` suffix.

For example

```
Object -> RedBook "red book"
    with name 'red' 'book' 'books//p';

Object -> BlueBook "blue book"
    with name 'blue' 'book' 'books//p';
```

can be used like

```
> take book
Do you mean the red book, or the blue book? > red

Taken.

> drop book
Dropped.

> take all books
red book: Taken.
blue book: Taken.
```

Inventory

Inventory is in wide mode by default. This is controlled with the global variable `inventory_style`. Set it to 0 for tall mode or 1 for wide mode. If you want to allow the player to control this with commands "inventory wide" and "inventory tall", define the constant `OPTIONAL_FLEXIBLE_INVENTORY`. Unlike the standard library, switching modes is handled by the `##Inv` action - there are no actions just for switching mode.

list_together and LanguageNumber

The library has optional support for listing similar (but not indistinguishable!) objects together when listing objects in room descriptions, inventory etc. To use this, define `OPTIONAL_LIST_TOGETHER`. If you want the library to print numbers using words, i.e. "three books", you must also define `OPTIONAL_ENGLISH_NUMBER`. This defines the library routine `LanguageNumber(n)`, which you can also use in your own code. If you have defined `DIALECT_US`, LanguageNumber will take it into account.

The library defines `list_together` as a common property. If you'd rather make it an individual property, put `Property individual list_together;` in your source, before including "globals.h". Using an individual property is slower.

Look at the file howto/list_together.inf for some examples on how `list_together` can be used.

Note: `OPTIONAL_LANGUAGE_NUMBER` and `OPTIONAL_ALLOW_WRITTEN_NUMBERS` have some overlap. If you define both, the cost is 32 bytes less than what is stated in the Customizing the library.

Giving Orders

When giving an order to an non-player character, for example "john, give me the hammer", then only single, sufficiently specified objects are allowed in the command. Commands such as "john, take all" or "john, take the ball" (when there is more than one ball available, which would normally prompt a disambiguation question) are not allowed and will cause the game to ask you to be more specific.

Changing the Player

A PunyInform game by default defines an object `selfobj` representing the player, and sets the `player` variable to this object, but the game author can define their own customized player object, or even switch player objects mid-game. By setting `CUSTOM_PLAYER_OBJECT` to an object, the game will set `player` to this object instead. For an example on how to switch `player` mid-game, see the change_player.inf file in the howto folder.

Capacity

The `capacity` property doesn't have a default value in PunyInform. To check the capacity of an object, call `ObjectCapacity(object)`. If the object has a value, it's returned (unless the value is a routine, in which case it is executed and the return value is returned). If the object doesn't have a value for capacity, the value `DEFAULT_CAPACITY` is returned. This value is 100, unless you have defined it to be something else.

Doors

Simple doors

PunyInform supports defining doors just the way it's described in DM4. In addition to this, PunyInform supports a more convenient way to define a door.

To enable it, define the constant OPTIONAL_SIMPLE_DOORS. This means two new mechanims come into play:

- If the door object has an array value for found_in with exactly two locations, it can leave out the door_to property. Instead, the library will assume that if the player is in the first location in the found_in array the door leads to the second location in the array and vice versa.

- If the door object has an array value for found_in with exactly two locations, it can also have an array value for door_dir. The first entry in door_dir corresponds to the first entry in found_in and the second entry in door_dir corrensponds to the second entry in found_in. Use parenthesis around the values to avoid compiler warnings.

In any single door object, you can use both of these mechanisms, either one of them, or none.

Example of a regular door in PunyInform:

```
Object -> BlueDoor "blue door"
    with
        name 'blue' 'door',
        door_to [;
            if(self in Hallway) return Office;
            return Hallway;
        ],
        door_dir [;
            if(self in Hallway) return n_to;
            return s_to;
        ],
        found_in Hallway Office,
    has static door openable;
```

And this is how to define the same door using OPTIONAL_SIMPLE_DOORS:

```
Object -> BlueDoor "blue door"
    with
        name 'blue' 'door',
        door_dir (n_to) (s_to),
        found_in Hallway Office,
    has static door openable;
```

Note: OPTIONAL_SIMPLE_DOORS adds 86 bytes to the library size, but it saves 22 bytes per door which uses both of the features. So if you use these features for at least four doors, it saves space.

The with_key property

Just as in the standard library, you can use the with_key property to say which key fits the lock for a lockable object. As an alternative to specifying an object

as a value, PunyInform allows you to specify a routine. The routine should return false or the object id of the key that fits the lock. When this routine is called, `second` holds the object currently being considered as a key. This can be used to allow multiple keys fit a lock. Example:

```
Object RedDoor "red door"
  with
    name 'red' 'door',
    with_key [;
      if(second == RedKey or RubyKey or SmallKey) return second;
    ],
    ...
  has static door lockable locked;
```

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.

If you need your daemons/timers to execute in a certain order, you can define the constant OPTIONAL_ORDERED_TIMERS and then set the property timer_order to any number for some or all objects with daemons/timers. A lower number means the daemon/timer will execute earlier. The default value is 100. Note that this number should not be changed while a daemon or timer is running.

The reactive attribute

NOTE: This section deals with an optimization you may want to perform before releasing a game. You can safely skip it while learning PunyInform and return to it when you're close to releasing a game, or not at all.

Each turn, PunyInform needs to check if any of the objects in scope provide any of these properties:

- react_before
- react_after
- each_turn
- add_to_scope
- parse_name (special, read below!)

These checks are rather time consuming, and they make the game noticably slower when many objects are in scope, at least on 8-bit machines. To alleviate this problem, PunyInform has an attribute **reactive** which all objects providing any of these properties must have (except possibly **parse_name** - keep reading

13

for details). This allows PunyInform to only check for these properties in objects which have the attribute (checking an attribute is a lot faster than checking a property), so gameplay becomes faster. By default, PunyInform figures out which objects need to have this attribute when the game starts. This process causes a delay of about 0.014 seconds per object on a C64, so up to about 3.5 seconds for a full-size z3 game. If you want the game startup to be quicker and/or you want to save some bytes, you can choose to set the `reactive` attribute manually instead. To do this, define the constant `OPTIONAL_MANUAL_REACTIVE`, compile the game in debug mode and type "DEBUG REACTIVE", and you will get a list of all objects that should have the attribute. Add the `reactive` attribute to each of these objects in the code. If all objects of a certain class should have the attribute, you can of course add the attribute to the class instead.

The `parse_name` property is special. By default, objects should NOT have the `reactive` attribute just because they provide the `parse_name` property. However, if you use `parse_name` rather sparingly, you can speed up parsing by defining the constant `OPTIONAL_REACTIVE_PARSE_NAME`. Of course, if you define this constant *and* `OPTIONAL_MANUAL_REACTIVE`, you must manually give all objects providing `parse_name` the `reactive` attribute. You should only define `OPTIONAL_REACTIVE_PARSE_NAME` if about 10% of your objects or less provide `parse_name`. If you use `parse_name` for lots and lots of objects, the game will be faster without this constant.

Note: `react_before` is an alias of `u_to`, `react_after` is an alias of `d_to`, `add_to_scope` is an alias of `in_to` and `parse_name` is an alias of `out_to`. For this reason, locations which provide `u_to`, `d_to`, `in_to` or `out_to` will be included in the DEBUG REACTIVE report as needing the `reactive` attribute. Unless these locations provide `each_turn`, they actually don't need the attribute. Giving them the attribute makes the game a tiny bit slower in these locations.

Note: The player object (AKA selfobj) provides `each_turn` and `add_to_scope`, both set to NULL or 0, to allow the game author to set it to one of their own routines. If you don't set them to anything (typically done in Initialise), there is no need to give the player object the `reactive` attribute. If you do, you will lose it from the debug report, but each turn of the game will also be (very slightly) slower.

Note: If you define `OPTIONAL_MANUAL_REACTIVE` and you have an object which has a `react_before` routine but doesn't have the `reactive` attribute, its `react_before` routine will never be run. Same thing with `react_after`, `each_turn`, `add_to_scope` and `parse_name`.

Statusline

Unless you start replacing routines (and avoid the z3 format) a PunyInform game always shows a statusline. You can select between two different types of statusline:

- To show score and turns in the status line, put `Constant STATUSLINE_SCORE;` `Statusline score;` in the beginning of the source.

- To show time in the status line, put `Constant STATUSLINE_TIME;` `Statusline time;` in the beginning of the source, and add a call to `SetTime` in the `initialise` routine (See example below).

```
Constant STATUSLINE_TIME; Statusline time;
Include "globals.h";
Include "puny.h";
[Initialise;
    SetTime(1 * 60 + 5, 5); ! 1:05 am, each turn 5 minutes
];
```

For z3 games, the statusline is always the same as for the standard library, as the statusline in z3 is controlled by the interpreter and not the library. For z5 and z8 games, PunyInform's statusline differs from the standard library: * The statusline is printed using a lot fewer instructions, making it render noticably faster on slow machines. * When the statusline is updated (typically once per turn), the new contents are printed over the existing contents. The standard library prints spaces over the old contents first, making the statusline appear to blink on slow machines. * The statusline adapts to different screen widths, selecting one of five different layouts to, in addition to the room name, show score and moves, only score or nothing. * The game can remove the score from the statusline by defining OPTIONAL_SL_NO_SCORE. Also, this happens automatically if the game defines NO_SCORE. * The game can remove the number of moves from the statusline by defining OPTIONAL_SL_NO_MOVES.

Scoring

Scoring works as in DM4, but it divided into three parts:

- Basic scoring using the `score` variable and the `MAX_SCORE` constant
- Scoring using the `scored` attribute and the `OBJECT_SCORE` and `ROOM_SCORE` constants, enabled by `OPTIONAL_SCORED`
- The fullscore verb, enabling the player to see a breakdown of the score, enabled by `OPTIONAL_FULL_SCORE`

If the game has added points in code, like `score = score + 10;`, The "full score" output will also show a line summarizing these points as "Performing noteworthy actions" (this doesn't happen in the standard library).

If `OPTIONAL_FULL_SCORE` is enabled, you can also choose to define `TASKS_PROVIDED` to enable support for tasks. Read DM4 for details on how to use this.

If constant `NO_SCORE` is defined, no scoring mechanism is included. If it's a z3 game and the statusline is of type "score", a score is displayed on the statusline.

The interpreter is responsible for showing the statusline in z3, and it can't be made not to show a value for score, unless it is set to show the time on the statusline. If the constant `NO_SCORE` is defined, the value of this constant (default is 0) is shown as the score on the statusline. Also see Statusline

Moves / Turns

The global variable `turns` has the value -1 until the first turn starts. This allows user-supplied code being invoked during initialization and the first room description to act differently based on this.

Library Messages and Customization

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

PunyInform uses two forms 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. You replace a message by defining constants and possibly a LibraryMessages routine before the inclusion of puny.h.

NOTE: A static string message can be replaced by a static string or a complex message, but a complex message can only be replaced by a complex message.

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 in the range 1000-1299 and provide a LibraryMessages routine to handle it, i.e:

```
Constant MSG_EXAMINE_NOTHING_SPECIAL 1000;

[LibraryMessages p_msg p_arg_1 p_arg_2;
    switch(p_msg) {
    MSG_EXAMINE_NOTHING_SPECIAL:
        print_ret (The) noun, " looks perfectly normal in every way.";
    }
];
```

The LibraryMessages routine takes three arguments - a message identifier (p_msg) and two optional arguments (p_arg_1 and p_arg_2) which a few

messages use. The return value of this routine is unimportant.

IMPORTANT: If you have defined a constant to replace a certain error message with a complex message, you *have to* print something for this message.

Printing the Contents of an Object

The standard library provides the routine `WriteListFrom()`. PunyInform provides `PrintContents()` instead. While not as versatile as WriteListFrom, it's meant to be easy to use, easy to remember how to use, and powerful enough to cover the needs for most situations. This is how it works:

```
PrintContents(p_first_text, p_obj, p_style);
Print what's in/on p_obj recursively, or decide if there are any
contents to be printed and if so, if they should be prefixed by
"is" or "are".

p_first_text:
    A string containing a message to be printed before printing
    the first item in/on p_obj. Can also be 0 to not print a
    text, or a routine, which will then be called with p_obj as
    an argument, or 1 to not print anything but investigate
    contents (see Return value).
p_obj:
    The container/supporter/person whose contents we want to list.
p_style:
    Add together 0 or more of the following values:
    ISARE_BIT: Print "is " or "are " before the first object.
    NEWLINE_BIT: Print a newline before each object and indent objects.
    WORKFLAG_BIT: On the top level, only print objects that have the
      workflag attribute set.

Return value:
    true if any items were printed, false if not.
    If p_first_text == 1, instead return the plural-factor for
    the printable contents (0 = No contents, 1 = Contains a
    single, non-pluralname object, 2 = Contains a pluralname
    object or multiple objects.)
```

Some examples of typical usage:

```
if(PrintContents("On the table you can see ", OakTable)) print ".";
else print "There's nothing on the table.";

if(PrintContents("On the table ", OakTable, ISARE_BIT)) print ".";
```

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`. This helps in keeping the object count down, considering that a z3 game can have no more than 255 objects.

Whenever the player has typed a direction, noun or second is `Directions` and `selected_direction` contains the property number for the direction the player typed. If the player didn't type a direction, `selected_direction` is 0. The name of the Direction object is always the currently selected direction, or "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, ".~, says Floyd.";
    ],
  has animate;
```

`selected_direction_index` can be used to look up the property number and the name of the direction:

```
! prints the property number, like 8
print direction_properties_array->selected_direction_index;
! prints the direction name, like "north"
print (string) direction_name_array-->selected_direction_index;
```

Note that direction_properties_array is a byte array and direction_name_array is a word array. The number of directions is held in the constant DIRECTION_COUNT. This is useful if you're writing a library extension and want to iterate over all directions in a safe manner. Please note that the directions are stored in element 1, 2, 3 .. DIRECTION_COUNT in these arrays.

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>>;
<<PushDir 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 calling DirPropTo-FakeObj():

```
dir_prop = ne_to; ! Or any direction you like
fake_obj = DirPropToFakeObj(dir_prop);
<<Go fake_obj>>;
```

There is also an inverse of this function, called FakeObjToDirProp().

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

Note that `AllowPushDir` isn't supported. See the pushdir.inf file in the howto folder for an example on how to implement pushing in PunyInform.

Disabling directions

If you (perhaps temporarily) don't want the game to recognize any directions, you can set the global variable normal_directions_enabled to false.

Ship directions

If you define the constant OPTIONAL_SHIP_DIRECTIONS, the parser will recognize 'fore' and 'f' as synonyms for north, 'aft' and 'a' as synonyms for south, 'port' and 'p' as synonyms for west, and 'starboard' and 'sb' as synonyms for east.

If you (temporarily) don't want the game to recognize ship directions, you can set the global variable ship_directions_enabled to false.

Look

When performing a Look action, PunyInform, just like the standard library, prints the room name, a newline and then the description of the room, held in the `description` property.

The standard library has a deprecated feature, allowing you to write the text describing the location in the `describe` property of the location object rather than the standard `description` property. This is not supported by PunyInform.

When deciding how to show objects, these are the rules that apply in PunyInform:

- If the object provides `describe`, print or run it. If it's a string, or it's a routine and it returns true, the object will not be described any further. Note that this string or routine should start by printing a newline, unless it's a routine which decides not to print anything at all.

- We will now figure out which the current description property of the object is:
  - If the object is a container or a door, it's `when_open` or `when_closed`, depending on its state.
  - If the object is a switchable object, it's `when_on` or `when_off`, depending on its state.
  - Otherwise, it's `initial`.
- If the object provides this property AND the object hasnt moved or the property is `when_off` or `when_closed`, then print a newline and run or print the string or routine held in the property.
- If, according to the above rules, nothing has yet been printed, include the object in the list of objects printed at the end.
- If OPTIONAL_PRINT_SCENERY_CONTENTS has been defined, print what can be seen in/on containers and supporters which have the scenery attribute.

Note: Thanks to aliasing, PunyInform uses only 27 common properties, which is 21 less than the Inform 6 library. This is necessary to support compiling to z3. However, this also means the library can't tell if an object provides `initial`, `when_on` or `when_open` - these are in fact all aliases for the same property. For this reason, the printing rules described above must be a little restrictive. In fact, the Inform Designer's Manual, 4th ed. describes rules which are equally restrictive, since Inform 6 used aliasing as well when the DM4 was released, but newer versions of the Inform 6 library are actually smarter than the DM4 says and will look at which properties are provided and act accordingly. For PunyInform, whenever you have problems getting the results you want using `when_on`, `when_open` etc, write the logic you like in a `describe` routine instead. That way you can make it work exactly the way you want.

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 an extension that approximates this functionality. See the Extensions section for more detail.

Scope

Scope in PunyInform is a list of things you can interact with. This includes things you can see in the room description, but can also include abstract concepts such as directions and discussion topics. Two library routines enable you to see what's in scope and what isn't. The first, `TestScope(obj, actor)`, simply returns true or false according to whether or not `obj` is in scope. The second is `LoopOverScope(routine, actor)` and calls the given routine for each object in scope. In each case the `actor` given is optional, and if it's omitted, scope is

worked out for the player as usual.

The routines ScopeCeiling, LoopOverScope, ScopeWithin and TestScope are implemented as described in DM4. The `ObjectIsUntouchable(obj, flag)` routine returns true if the `obj` is untouchable from the player's point of view. If `flag` is true, then the routine never writes anything and only returns true or false to say if the `obj` was untouchable or not. If `flag` is false, the routine will also write messages like "You can't because . . . is in the way." when a problem was found.

The standard Inform parser uses a number of internal scope variables that are not used in PunyInform, including `scope_reason`. Code that relies on these variables has to be rewritten. However, `scope_stage` is supported and is used when the scope token is used, so constructs like the code fragment below work as described in DM4.

```
Object questions "questions";
Object -> "apollo"
  with name 'apollo',
       description "Apollo is a Greek god.";

[ QueryTopic;
  switch (scope_stage) {
      1: rfalse;
      2: ScopeWithin(questions); rtrue;
      3: "At the moment, even the simplest questions confuse you.";
  }
];

[ QuerySub; noun.description();];
Verb 'what' * 'is'/'was' scope=QueryTopic -> Query;
```

Manual Scope

Normally, PunyInform updates the scope when a turn starts, before the after routines are run, before the timers and daemons are run, and before each_turn is run. To get the best possible performance, you can switch to manual scope updates. You do this by defining the constant `OPTIONAL_MANUAL_SCOPE`. With manual scope enabled, scope is only updated when the program signals that an update may be needed. You signal this by setting the variable `scope_modified` to `true`. A simple rule is to do this anytime you use `move` or `remove` or you alter any of the attributes `open`, `transparent`, `light`. This is already in place in the `PlayerTo` routine as well as in the action routines for Open, Close etc. Sample usage:

```
Object Teleporter "teleporter"
  with
    name 'teleporter',
```

```
    capacity 1,
    before [ c;
      SwitchOn:
        c = child(self);
        if(c ~= 0) {
          move c to SecretChamber;
          scope_modified = true;
          print_ret (The) c, " disappears!";
        }
    ],
  has container openable transparent;
```

Replacing the Player Object

If you want to define your own player object, you can do so, and define the constant CUSTOM_PLAYER_OBJECT, setting it to the object ID of the player object you created. The library will then refrain from creating the default player object (`selfobj`).

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.

Held tokens and automatic take

Just like the Inform 6 parser, the PunyInform parser will try to take an object that matches a `held` token. However, it will not try to take an object which has the `static`, `scenery` or `animate` attribute, with the exception of animate objects which have been made takeable through the use of a `DisallowTakeAnimate` routine. This allows `before` routines to react to things like "EAT WHALE" and "ATTACK TROLL WITH STEAMROLLER". This feature of the parser requires a little caution, since this means that when `before` routines are run and even when the action routine is run, an object that was matched by a `held` token is not guaranteed to be in the player's possession. As a game author, you typically solve this be adding a line like this at the start of any action routine which uses a `held` token: `if(ImplicitGrabIfNotHeld(noun)) rtrue;`.

ParseToken

The ParseToken library routine may be of limited use, but DM4 gives two examples of ways to use it. Both these examples can be implemented in PunyInform as well, but the constants are named differently.

Parsing a number: `ParseToken(TT_OBJECT, NUMBER_OBJECT)`

Parsing an object that's in a special scope: `ParseToken(TT_SCOPE, MyScopeRoutine)`

Unsupported Properties and Attributes

PunyInform lacks support for a few properties and attributes which the standard library support: * Properties `articles` and `short_name_indef`: These are intended for use with languages other than English, something PunyInform doesn't support. * Property `plural`: This is intended for use with identical objects, something PunyInform doesn't support. * Propery `number`: This property was added to the Inform library before individual properties were supported. With individual properties available, there is little reason to define this generic property. If you use it in your code, it's automatically created as an individual property. If you use it heavily, you may want to make it a common property. To do this, just add `Property number;` right after including "globals.h". * Attribute `male`: If you define an animate object and don't give it `female` or `neuter`, it will be considered male automatically. This is done to leave one more attribute free for the game author's use.

Programming Advice

Error messages

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 if the constant RUNTIME_ERRORS is set to 2.

Debugging

By defining the constant DEBUG (or adding -D to the inform 6 compiler commandline), the game is compiled in debug mode. This means a number of meta verbs are available for inspecting the game world and examining which routines and actions are executed. These are the debug verbs supplied:

TREE : Show the object tree for the current location. *TREE [object]* : Show the object tree for this object.

GONEAR [object] : Teleport to the location of the object.

SCOPE [actor] : List the objects which are currently in scope for the actor. Actor defaults to player.

PRONOUNS : List what he, she, it and them are currently referring to.

RANDOM [number] : Seed the pseudo-random number generator, to make randomization predictable. Number defaults to 100.

PURLOIN [object] : Teleport the object into your inventory, no matter where it is.

ROUTINES [on/off] : Show which routines are being executed.

ACTIONS [on/off] : Show which actions are being invoked.

TIMERS [on/off] : Show which timers and daemons are being executed.

DEBUG REACTIVE : Show which object have the reactive attribute but shouldn't and which don't have it but probably should. See The reactive attribute.

DebugParseNameObject

Some debug verbs take an object or an actor as an argument. The scope for these verbs are unlimited - they can refer to objects which are in a different location or even in no location. It can be hard or even impossible for the parser to decide if an object which doesn't have a parent is a room or a normal object. This causes problems when an object has a parse_name routine. If you have problems referring to an object which has a parse_name routine and may lack a parent in the object tree, you can create a routine called DebugParseNameObject to help out. It should return true for every such object and false for other objects. It's okay if it returns true for other normal objects, but it must never return true for a room. Example implementation which returns true for the three objects in the list and false for all other objects:

```
#Ifdef DEBUG;
[ DebugParseNameObject p_obj;
    if(p_obj == RecordPlayer or Record or Robot) rtrue;
    else rfalse;
];
#Endif;
```

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 been 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. You can also change some parameters in the library from their default values to further adjust the library size as needed. Finally you can use abbreviations to reduce the game size further. PunyInform includes a set of standard abbreviations which can be enabled as needed.

These customizations are described in detail in the following sections.

Optionals

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

Option	Bytes	Comment
DEBUG	4068	Enable some debugging verbs for game development. These include 'scope', 'random', 'pronouns', 'tree', 'purloin', 'gonear', 'routines', 'actions' and 'timers'/'daemons'.
CUSTOM_PLAYER_ OBJECT	-	Set it to an object ID and that object will be used as the player object, and the default player object (`selfobj`) won't be created.
NO_SCORE	-310	Don't include any code for keeping track of score. The value of the constant is shown as the score on the statusline in z3.
OPTIONAL_SL_NO_ SCORE	-40	Don't show score on the statusline in z5+ games. Defining NO_SCORE will define OPTIONAL_SL_NO_SCORE automatically.
OPTIONAL_SL_NO_ MOVES	-36	Don't show moves on the statusline in z5+ games.
OPTIONAL_ALLOW_ WRITTEN_NUMBERS	274	Enable parsing of "one", "two" etc as numbers.
OPTIONAL_ LANGUAGE_NUMBER	376	Add the routine LanguageNumber(n) to print a number with words, taking DIALECT_US into account. Can be used with OPTIONAL_LIST_TOGETHER. See list_together and LanguageNumber for some notes on this.
OPTIONAL_ EXTENDED_ METAVERBS	940	Add a set of less important, but nice to have, meta verbs to the grammar.
OPTIONAL_ EXTENDED_ VERBSET	2152	Add a set of less important, but nice to have, verbs to the grammar.

Option	Bytes	Comment
OPTIONAL_FLEXIBLE_ INVENTORY	68	Allow the player to type "inventory tall/wide" to switch inventory mode.
OPTIONAL_FULL_ DIRECTIONS	112	Include directions NW, SW, NE and SE. Including them also makes the parsing process slightly slower in z3 mode.
OPTIONAL_FULL_ SCORE	258	Add the fullscore verb, and optional support for tasks as described in DM4. Size grows by another 78 bytes if `OPTIONAL_SCORED` is defined.
OPTIONAL_GUESS_ MISSING_NOUN	290	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.
OPTIONAL_LIST_ TOGETHER	608	Support the list_together property for grouping similar objects in lists. See list_together and LanguageNumber for some notes on usage.
OPTIONAL_MANUAL_ REACTIVE	-44	Leave it to the author to set the `reactive` attribute, for faster game start. See The reactive attribute for instructions on how to use it.
OPTIONAL_MANUAL_ SCOPE	12	Let the game code say when scope needs to be updated, for better performance. See Manual Scope for instructions on how to use it.
OPTIONAL_NO_ DARKNESS	-360	Skip support for light and darkness - there is always light everywhere. Unlike the other optionals, this one makes the game smaller.

Option	Bytes	Comment
OPTIONAL_ORDERED_ TIMERS	104	Lets you assign an order number (property `timer_order`, default = 100) to each timer or daemon, defining the order of execution - low numbers execute early.
OPTIONAL_PRINT_ SCENERY_CONTENTS	80	Have Look show what is in/on containers and supporters which have the scenery attribute.
OPTIONAL_PROVIDE_ UNDO	212	Add undo functionality (z5 and z8 only).
OPTIONAL_REACTIVE_ PARSE_NAME	8	Let objects which provide `parse_name` have the `reactive` attribute. See The reactive attribute for instructions on how to use it.
OPTIONAL_SCORED	28	Add support for the scored attribute as described in DM4.
OPTIONAL_SIMPLE_ DOORS	86	Allow for a simpler way of defining doors. This also ends up saving space if you have more than three doors that use this mechanism. See Doors for instructions on how to use it.
OPTIONAL_SHIP_ DIRECTIONS	92	Add fore, aft, port and starboard as directions. See Ship Directions for instructions on how to use it.

Parameters

The parameters listed in the table below can be adjusted in a game by redefining them before globals.h is included.

Parameter	Default	Comment
DEFAULT_CAPACITY	100	Default number of items that can be in a container, on a supporter or held by a creature.

Parameter	Default	Comment
MAX_CARRIED	32	Max. number of items the player can carry at once
MAX_WHICH_OBJECTS	10	Max. number to include in a "which X do you mean?" parser question
MAX_MULTIPLE_OBJECTS	32	Max. number of objects that match "all" in an input such as "get all"
MAX_INPUT_CHARS	78	Max. number of characters in one line of input from the player
MAX_INPUT_WORDS	20	Max. number of words in a parsed sentence
MAX_FLOATING_OBJECTS	32	Max. number of floating objects
MAX_TIMERS	32	Max. number of timers/daemons running at once
MAX_SCOPE	32	Max. number of objects to consider when calculating the scope of the player
RUNTIME_ERRORS	1 or 2	Runtime error reporting: 0 = minimum, 1 = report all errors using error codes, 2 = report all errors using error messages. Default is 2 in DEBUG mode, and 1 when not in DEBUG mode.

Abbreviations

PunyInform can 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 30 common properties. PunyInform defines 27 common properties.

- A game can use no more than 32 attributes. PunyInform defines 29 attributes (+1 if `OPTIONAL_SCORED` is defined, -1 if `OPTIONAL_NO_DARKNESS` is defined).
- 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.)
- Routine calls can have no more than three arguments.
- 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.
- The room name printed on the statusline is always the object name string. It can't be overridden with short_name in a class or in the same object. Read below for a possible workaround.
- It is not possible to support the 'undo' verb.
- There is no support for bold or italic text.
- The cursor position can't be read or set. Among other things, this makes it impossible to print a menu and let the player move up and down in it with certain keys.
- It is not possible to wait for the user to press a key, or read a single keypress - you can only read a whole line of input.
- The interpreter is responsible for displaying the statusline. It will show a score even if you define NO_SCORE. It's not possible to hide the statusline.

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, typically like "box". This behavior in z3 games is part of the Z-machine specification so it's nothing that the game or the library can change. 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 27 common properties, so if you're building a z3 game, you can only add three common properties. 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 my_property_name;
```

Declaring individual properties is optional, but may result in slightly shorter code. It's done with

```
Property individual my_property_name;
```

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) ...
```

Extensions

PunyInform keeps the library code size down by only providing the most fundamental functionality by default, but ships with several extensions which can easily be added to games.

cheap_scenery

(Can also be used with the standard library)

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, and even more with `CS_ADD_LIST` (see below).

For each scenery object specify three values, in this order: an adjective, a noun, and a reaction string/routine. Instead of an adjective, you may give a synonym to the noun. If no adjective or synonym is needed, use the value `CS_NO_ADJ` (= 1) in that position. For more complex names, give `CS_PARSE_NAME` (= 2) in the adjective position and a routine to work like a `parse_name` routine in the noun position. Finally, you can add a list stored in a property in the same or another object, by giving the value `CS_ADD_LIST` (= 3), followed by an object ID and a property name (put the property name within parentheses to avoid compiler warnings). You typically want to use a list like this to give general descriptions for scenery objects in a group of locations. If you want an exception for a certain scenery object in one location, just give it a different description *before* linking to the general list (See "Example usage" below).

The reaction can be either:

- a string to be used as the description of the object
- a routine which will act as a before routine for the object - this can be used to trap the Examine action and print a dynamic description of the object,

32

> but also to react to any other actions the player may try to perform on the object.

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 reaction for a scenery object in several locations, declare a constant to hold that string, and refer to the constant in each location. Note that if this is a routine, you typically want to end it with `default: rfalse;` since a named routine returns `true` by default, which would lead it to block all actions which the routine doesn't handle.

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`. The routine is called with three parameters - `word1`, `word2` and `routine`. If a line using CS_PARSE_NAME was matched, `word1` is `CS_PARSE_NAME`, `word2` is 0 and `routine` is the routine address. If the routine set `cs_parse_name_id` to a non-zero value, `routine` holds this value instead of the routine address. If the line matched didn't use CS_PARSE_NAME, `word1` is the adjective value, `word2` is the noun value and `routine` is 0. Note that this may not be exactly what the player typed, e.g. the player may have typed "examine water" but the words listen in the property are 'blue' 'water'. In this case, `word1` will be 'blue' and `word2` will be 'water'.

If constant `RUNTIME_ERRORS` is defined and has a value greater than 0, the extension will complain about programming mistakes it finds in the `cheap_scenery` data in rooms. Otherwise, it will keep silent.

Note: If you include this extension, you must either declare `cheap_scenery` as a common property, or use it as an individual property in at least one object, or you will get a compilation error (No such constant as "cheap_scenery").

Example usage:

```
! Cheap Scenery Parse Name constants. Use values 1-600.
Constant CSP_LIBRARY 1;

[ SceneryReply word1 word2 routine;
    ! We can check location, if we want different answers in different rooms
    ! We can also check action, and there's even an implicit switch on action,
    ! so we can do things like: Take: "You're crazy.";
    switch(routine) {
    ParseNameAir:
        "You need the air to breathe, that's all.";
    CSP_LIBRARY:
```

```
            "The library is super-important. Better not mess with it.";
        }
        if(location == Library && word1 == 'book' && word2 == 'books')
            "Leave the books to the people who care about them.";
        rfalse;
];


Include "ext_cheap_scenery.h";
Include "puny.h";

[ ParseNameAir;
    if(NextWord() == 'air') return 1;
    rfalse;
];


[ WallDesc;
    Examine:
        "The walls are ",
            (string) random("all white", "claustrophobia-inducing", "scary",
                "shiny"), " here.";
    default:
        rfalse; ! Necessary in a named routine
];


Constant BOOKDESC "You're not interested in reading.";

Object Library "The Library"
    with
        description "You are in a big lovely library. You can examine or try to
            take the books, the shelves, the library, the air, the walls and
            the ceiling.",
        cheap_scenery
            CS_ADD_LIST Library (inside_scenery)
            'book' 'books' BOOKDESC
            'shelf' 'shelves' "They're full of books."
            CS_PARSE_NAME ParseNameAir "The air is oh so thin here."
            CS_PARSE_NAME [ _i _w;
                cs_parse_name_id = CSP_LIBRARY;
                _w = NextWord();
                if(_w == 'big') { _i++; _w = NextWord();}
                if(_w == 'lovely') { _i++; _w = NextWord();}
                if(_w == 'library') { _i++; return _i;}
                return 0;
            ] "It's truly glorious.",
        inside_scenery
            'wall' 'walls' WallDesc
```

```
            CS_NO_ADJ 'ceiling' "The ceiling is quite high up.",
    has light;
```

flags

(Can also be used with the standard library)

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 static memory, and one byte is added to dynamic memory for every eight flags. All in all this is a very memory-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 routine `SetFlag` or `ClearFlag`

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.

talk_menu

(Can also be used with the standard library, when compiling to Z-code)

This extension lets you define a set of topics for each character which the player can talk to him or her about. The player can type "TALK TO (someone)" and get a menu of topics they can talk about. Each topic can unlock new topics, set flags (if you include ext_flags.h), and run routines.

Setup

To use this extension, define a word array called `talk_array` somewhere in your source code. For each NPC the player should be able to talk to, add a section starting with `TM_NPC` and the NPCs object ID. Then add one or more talk topics.

End the array with `TM_NPC 0`. Also, each NPC which the player should be able to talk to must provide the property `talk_start`. In `Initialise`, add a call to `InitTalk()` (see talk_menu initilisation for other options).

Talk topics

A talk topic has the following form:

`STATUS [ID] TOPIC PLAYERSAYS NPCSAYS [FLAGREF|UNLOCKREF|ROUTINE]*`

- `[]` = Optional

- `*` = can be more than one

- *STATUS* is either 0 (= `TM_INACTIVE` = not active) or 30 (= `TM_ACTIVE` = active) or 31 (= `TM_STALE`, has been used).

- *ID* is a number (300-600) which can be used as a reference to activate the topic in code or using an *UNLOCKREF* in `talk_array`. Note that IDs are local to the NPC - two different NPCs can use the same ID for different topics without risk of confusion.

- *TOPIC* is a string or routine for the topic name

- *PLAYERSAYS* is a string or routine for what the player says

- *NPCSAYS* is a string or routine for what the NPC replies

- *FLAGREF* is a number 32-299 for a flag to be set (In order to use this, you must include ext_flags.h before including ext_talk_menu.h)

- *UNLOCKREF* is either a topic ID (300-600) or a relative reference to a topic (1 to 29) that should be activated by this topic. 1 means the next topic, 2 the topic after that etc. The target topic has to have status `TM_INACTIVE` (= 0) or `TM_ACTIVE` (= 30) for this to work. When a topic is used, it is set to status `TM_STALE`, and the only way to change it from status `TM_STALE` is to call `ReActivateTopic` or `ReInactivateTopic`.

- *ROUTINE* is the name of a routine to be run. In this routine, the global variable `current_talker` refers to the NPC being talked to.

Whenever a routine is used for PLAYERSAYS, NPCSAYS or ROUTINE, it can set the global `talk_menu_talking` to `false` to end the conversation after the current topic. When doing this, you may want to use ROUTINE to print a suitable message about why the conversation ended.

A sample talk_array

Example of an array giving Linda one active topic (Weather), which will activate the next topic (Heat) and the topic with ID 300 (Herself):

```
Array talk_array -->
TM_NPC Linda
0 300 "Herself" "Tell me more about yourself!" "I'm just an average girl."
30 "Weather" "How do you like the weather?" "It's too hot for me." 1 300
0 "Heat" "Say, don't you like hot weather?" "No, I prefer it cold."
TM_NPC 0;
```

Allowing for more flags and/or topic IDs

If you find that you need more topic IDs, or more flags, you can define which number should be the lowest one to be considered an ID (32-600, default is 300) by defining the constant `TM_FIRST_ID`, i.e. to get 100 more IDs and 100 less flags, do this before including ext_talk_menu.h:

```
Constant TM_FIRST_ID = 200; ! 32-199 are now flags, while 200-600 are IDs
```

Should you find that you need both a lot of flags and a lot of topic IDs, you can:

1. Make sure all routines you refer to in `talk_array` are defined *after* including all library files.
2. Set the constant `TM_LAST_ID` to 2000. Instead of 300-600, you can now use 300-2000 for topic IDs.
3. In conjuction with this, you can also use TM_FIRST_ID to define where flags end and topic IDs begin.

talk_menu routines

Apart from activating topics using UNLOCKREFs in the talk_array, you can also use these routines:

- `InitTalk()`: Must be called before the player starts their first conversation, or code calls any of the other procedures. Calling it in Initialise is a good idea.
- `ActivateTopic(NPC, topic)`, returns true for success, false for fail: Activates the topic if it's currently inactive or active (not stale!).
- `ReActivateTopic(NPC, topic)`, returns true for success, false for fail: Activates the topic, regardless of its status.
- `InactivateTopic(NPC, topic)`, returns true for success, false for fail: Inactivates the topic if it's currently inactive or active (not stale!).
- `ReInactivateTopic(NPC, topic)`, returns true for success, false for fail: Inactivates the topic, regardless of its status.
- `GetTopicStatus(NPC, topic)`, returns topic status (`TM_INACTIVE`, `TM_ACTIVE` or `TM_STALE`)

If you call these routines with `DEBUG` defined *and* `RUNTIME_ERRORS` > 0 will be notified whenever a problem is detected. As usual, use `RUNTIME_ERRORS = 2` to get the maximum amount of information (This is the default when compiling in `DEBUG` mode).

talk_menu initialisation

To initialise the system, either:

- A: (more convenient)
    1. In your Initialise routine , call `InitTalk()` OR
- B: (better performance):
    1. Compile the game in `DEBUG` mode
    2. Run the game and type "TALK SETUP"
    3. Enter the printed values into the `talk_start` property for each NPC
    4. Define the constant `NO_INITTALK` to skip the `InitTalk` routine, as it won't be needed.
    5. If you add or remove any values in `talk_array`, comment out the `NO_INITTALK` constant and go to step 1 again.

Recommendation: Stick to (A) until your game is ready for release, then switch to (B). This makes the game start a little faster and saves some bytes.

talk_menu example

There is an example game in the PunyInform distribution that uses the talk_menu extension, in the file howto/talk_menu.inf.

menu

This is an extension to let games show a menu of text options (for instance, when producing instructions which have several topics, or when giving clues). This can be done with the `DoMenu` routine, which is very similar to the DoMenu in the standard Inform library. In version 3 mode it will create a simple text version instead because of technical limitations.

A common way of using `DoMenu` is from a "help" verb, which can be declared like so:

```
Include "ext_menu.h";

! add HelpItem, HelpMenu and HelpInfo here

[ HelpSub;
    DoMenu(HelpItems, HelpMenu, HelpInfo);
];

Verb 'help' * -> Help;
```

Below is how `DoMenu` was described in the *Inform Designer's Manual, 3rd edition*.

Extract from DM3

Here is a typical call to `DoMenu`:

```
DoMenu("There is information provided on the following:^
        ^       Instructions for playing
        ^       The history of this game
        ^       Credits^",HelpMenu, HelpInfo);
```

Note the layout, and especially the carriage returns.

The second and third arguments are themselves routines. (Actually the first argument can also be a routine to print a string instead of the string itself, which might be useful for adaptive hints.) The `HelpMenu` routine is supposed to look at the variable `menu_item`. In the case when this is zero, it should return the number of entries in the menu (3 in the example). In any case it should set `item_name` to the title for the page of information for that item; and `item_width` to its length(*) in characters (this is used to centre titles on the screen). In the case of item 0, the title should be that for the whole menu.

The second routine, `HelpInfo` above, should simply look at `menu_item` (1 to 3 above) and print the text for that selection. After this returns, normally the game prints "Press [Space] to return to menu" but if the value 2 is returned it doesn't wait, and if the value 3 is returned it automatically quits the menu as if Q had been pressed. This is useful for juggling submenus about. Menu items can safely launch whole new menus, and it is easy to make a tree of these (which will be needed when it comes to providing hints across any size of game).

(*) DM3 actually says to set `item_width` to half the length of the title. This looks like a bug and makes using menus unintuitive, so we decided to change this for ext_menu. However, if you're making a game that should be compilable with either PunyInform and its menu extension or the standard library where DoMenu is included, you may want to use the standard library behaviour on `item_width`. In this case, define the constant EXT_MENU_STDLIB_MODE before including this extension.

quote_box

This is an extension to let games show a simple quote box. For z5+ games, the extension will try to center the quote box on the screen, by reading the screen width reported by the interpreter in the header.

For z3, this information is not available. Instead, it can do it two ways: 1. The game programmer tells the extension to assume the screen has a certain width and the extension uses this information to center the quote box. 2. The game programmer tells the extension to just indent the quote box a fixed number of characters.

To use (1), set the constant QUOTE_V3_SCREEN_WIDTH to the desired width, which has to be > 6.

To use (2), set the constant QUOTE_V3_SCREEN_WIDTH to the desired number of characters to indent by, which must be in the range 0-6.

By default, method (2) will be used, with 2 characters of indentation.

To display a quote box, create a word array holding the number of lines, the number of characters in the longest line, and then a string per line, and call QuoteBox with the array name as the argument.

```
Include "ext_quote_box.h";

Array quote_1 --> 5 35
"When I die, I want to go peacefully"
"in my sleep like my grandfather."
"Not screaming in terror, like the"
"passengers in his car."
"              -- Jack Handey";
!
[AnyRoutine;
  QuoteBox(quote_1);
];
```

waittime

This extension gives players an extended Wait command, which can be used to wait a certain number of turns, minutes or hours, or to wait until a certain time of day is reached.

In a game showing time on the statusline, the player can use commands such as:

```
>wait for 5 minutes
>wait 1 hour
>wait until 1:20
>wait till three o'clock
>wait till quarter to five
>wait till 5 am
>wait 3 turns/moves
```

A turn or a move may be the same as a minute, depending on the time scale (how many minutes the clock is advanced per turn, or how many moves it takes before the clock is advanced one minute).

Note: Using words for numbers requires OPTIONAL_ALLOW_WRITTEN_NUMBERS.

While the player is waiting, the global variable waittime_waiting has the value true. A daemon or each_turn routine may show an event which could make

the player want to abort the waiting and spring to action. If this happens, set waittime_waiting to false.

If game time is suddenly changed, typically using a SetTime() call, it is a good idea to abort any ongoing waiting.

This extension also includes the parse routine `parsetime` to parse times of day, like "1:20", "quarter to five", "3:10 pm" etc, which can also be used for other verbs which need this, like setting a watch or clock. The parsed time (in minutes after midnight) comes in `noun` or `second`.

In a game showing score/turns on the statusline, the commands to wait for a certain number of turns, minutes or hours still work. A minute is considered the same as a turn. The command to wait until a certain time of day is not available, and neither is the parsetime routine.

This extension must be included after including "puny.h". Before including it, you may define the constants MAX_WAIT_MINUES and MAX_WAIT_MOVES to say how long the player is allowed to wait for using a single command.

Appendix A: 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 work the same, or in a very similar manner, 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
Banner	
CommonAncestor	
DrawStatusLine	Not available in version 3 games
LanguageNumber	Optional. See list_together and LanguageNumber.
IndirectlyContains	
LoopOverScope	
MoveFloatingObjects	
NextWord	
NextWordStopped	
ObjectIsUntouchable	
PlayerTo	
ParseToken	See ParseToken
PlaceInScope	
PronounNotice	
SetTime	
ScopeWithin	
TestScope	

Library Routine	Comment
TryNumber	
WordAddress	
WordLength	
WordValue	
YesOrNo	

These library routines are not supported

Library Routine	Comment
AllowPushDir	See Direction Handling

Entry Point Routines

These entry point routines are supported by PunyInform, as described in the DM4.

Entry Point Routine	Comment
AfterLife	
AfterPrompt	
Amusing	
BeforeParsing	
ChooseObjects	
DarkToDark	
DeathMessage	
GamePostRoutine	
GamePreRoutine	
Initialise	Mandatory.
InScope	The et_flag isn't supported.
LookRoutine	
NewRoom	
ParseNoun	Unlike in the standard library, this is called *before* the `parse_name` property.
ParseNumber	
PrintRank	OPTIONAL_FULL_SCORE
PrintTaskName	OPTIONAL_FULL_SCORE + TASKS_PROVIDED
PrintVerb	
TimePasses	
UnknownVerb	

These entry point routines are not supported

Entry Point Routine	Comment
ParserError	The parser internals differ too much

PunyInform Entry Point Routines

These entry point routines are supported by PunyInform, but not by the standard library.

Entry Point Routine	Comment
DebugParseNameObject	See DebugParseNameObject
DisallowTakeAnimate	See Animate Objects
LibraryMessages	See Library Messages and Customization

Additional Public Routines

These routines are supported by both the standard library and PunyInform, but are not documented in DM4.

Routine Name	Comment
NumberWord	
NumberWords	
PrintOrRun	
RunRoutines	
CTheyreorThats	Printing-rule
IsOrAre	Printing-rule
ItorThem	Printing-rule
ThatOrThose	Printing-rule

PunyInform Public Routines

These public routines are provided by PunyInform, but not by the standard library.

Routine Name	Comment
CObjIs	Printing-rule
FastSpaces	Prints the specified number of spaces in an efficient manner.

Routine Name	Comment
ImplicitDisrobeIfWorn	Take off the object if worn by actor, which must be player
ImplicitGrabIfNotHeld	Take the object if not held by actor, which must be player
OnOff	Printing-rule
ObjectCapacity	See Capacity
PrintContents	See Printing the Contents of an Object
PrintMsg	
RunTimeError	

Appendix B: List of Properties

These are the properties defined by the library:

Property	Read more below
add_to_scope	
after	
article	
before	
cant_go	
capacity	Y
d_to	
daemon	
describe	
description	
door_dir	
door_to	
each_turn	
e_to	
found_in	
in_to	
initial	
inside_description	
invent	
life	
list_together	Y
n_to	
name	
ne_to	
nw_to	
orders	
out_to	

Property	Read more below
parse_name	Y
react_after	
react_before	
s_to	
se_to	
short_name	
sw_to	
time_left	
time_out	
timer_order	Y
u_to	
w_to	
when_closed	
when_off	
when_on	
when_open	
with_key	Y

The properties articles, number, plural and short_name_indef, which are supported by the Inform 6 library, are not supported by PunyInform.

- The `capacity` property doesn't have a default value in PunyInform. To check the capacity of an object, call `ObjectCapacity(object)`. If the object has a value, it's returned (unless the value is a routine, in which case it is executed and the return value is returned). If the object doesn't have a value for capacity, the value `DEFAULT_CAPACITY` is returned. This value is 100, unless you have defined it to be something else.

- `list_together` is only used if `OPTIONAL_LIST_TOGETHER` is defined. It is a common property, unless you declare it as an individual property using `Property individual list_together;`. Read more about list_together in list_together.

- The `parse_name` property works as described in DM4 except that, since PunyInform doesn't support identical objects, it is never called to check whether or not two objects which share the same parse_name routine are identical.

- `timer_order` is only used if `OPTIONAL_ORDERED_TIMERS` is defined. It is an individual property, unless you declare it as a common property using `Property timer_order;`. Read more about ordered timers in Daemons and timers.

- The `with_key` property can also hold a routine. The routine should return false or the object id of the key that fits the lock. When this routine is

called, `second` holds the object currently being considered as a key. This can be used to allow multiple keys fit a lock.

Appendix C: List of Attributes

These attributes are the same as in DM4.

Attribute	Read more below
absent	
animate	
clothing	
concealed	
container	
door	
edible	
enterable	
female	
general	
light	Y
lockable	
locked	
moved	Y
neuter	
on	
open	
openable	
pluralname	
proper	
scored	Y
scenery	
static	
supporter	
switchable	
talkable	
transparent	
visited	

Attribute	Read more below
workflag	
worn	

- `light` is not defined if `OPTIONAL_NO_DARKNESS` is defined.
- `scored` is only defined if `OPTIONAL_SCORED` is defined.
- For `moved` to be updated and `scored` to be considered, you need to set `update_moved` to true whenever moving objects into the player's possession in code. See Moving objects.

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 an object is animate and it is not female or neuter

These attributes are used in PunyInform but not in the Inform standard library.

Attribute	Comment
reactive	See The reactive attribute for instructions

Appendix D: List of Variables

These variables are the same as in DM4.

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

These variables are PunyInform only.

Variable

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

Variable
c_style
et_flag
listing_together
lm_n
lm_o
notify_mode
parser_one
parser_two
scope_reason
standard_interpreter
the_time
vague_object

Appendix E: List of Constants

These constants are the same as in DM4.

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

These constants 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
ANIMA_PE
ASKSCOPE_PE
CANTSEE_PE
EACHTURN_REASON

Constant Name
ELEMENTARY_TT
EXCEPT_PE
ITGONE_PE
JUNKAFTER_PE
LOOPOVERSCOPE_REASON
MMULTI_PE
MULTI_PE
NO_PLACES
NOTHELD_PE
NOTHING_PE
NUMBER_PE
PARSING_REASON
REACT_AFTER_REASON
REACT_BEFORE_REASON
SCENERY_PE
SCOPE_TT
STUCK_PE
TALKING_REASON
TESTSCOPE_REASON
TOOFEW_PE
TOOLIT_PE
UPTO_PE
USE_MODULES
VAGUE_PE
VERB_PE

Appendix F: Grammar

Here are the standard verbs defined in the library.

Verbs
answer say speak
ask
attack break crack destroy
climb scale
close cover shut
cut chop prune slice
dig
drink sip swallow
drop discard throw
eat
enter cross
examine x
exit out outside
fill
get
give feed offer pay
go run walk
insert
inventory inv i
jump hop skip
leave
listen hear
lock
look l
open uncover unwrap
pick
pull drag
push clear move press shift
put place
read

Verbs

remove
rub clean dust polish scrub
search
shed disrobe doff
shout scream yell
show display present
sit lie
smell sniff
stand
switch
take carry hold
tell
tie attach fasten fix
touch feel fondle grope
turn rotate screw twist unscrew
unlock
wait z
wear don

This set of extended verbs are not included by default, but can be added by defining OPTIONAL_EXTENDED_VERBSET.

Verbs	Comment
blow	OPTIONAL_EXTENDED_VERBSET
bother curses darn drat	OPTIONAL_EXTENDED_VERBSET
burn light	OPTIONAL_EXTENDED_VERBSET
buy purchase	OPTIONAL_EXTENDED_VERBSET
consult	OPTIONAL_EXTENDED_VERBSET
empty	OPTIONAL_EXTENDED_VERBSET
in inside	OPTIONAL_EXTENDED_VERBSET
kiss embrace hug	OPTIONAL_EXTENDED_VERBSET
no	OPTIONAL_EXTENDED_VERBSET
peel	OPTIONAL_EXTENDED_VERBSET
pray	OPTIONAL_EXTENDED_VERBSET
pry prise prize lever jemmy force	OPTIONAL_EXTENDED_VERBSET
set adjust	OPTIONAL_EXTENDED_VERBSET
shit damn fuck sod	OPTIONAL_EXTENDED_VERBSET
sing	OPTIONAL_EXTENDED_VERBSET
sleep nap	OPTIONAL_EXTENDED_VERBSET
sorry	OPTIONAL_EXTENDED_VERBSET
squeeze squash	OPTIONAL_EXTENDED_VERBSET
swim dive	OPTIONAL_EXTENDED_VERBSET

Verbs	Comment
swing	OPTIONAL_EXTENDED_VERBSET
taste	OPTIONAL_EXTENDED_VERBSET
think	OPTIONAL_EXTENDED_VERBSET
transfer	OPTIONAL_EXTENDED_VERBSET
wake awake awaken	OPTIONAL_EXTENDED_VERBSET
wave	OPTIONAL_EXTENDED_VERBSET
yes y	OPTIONAL_EXTENDED_VERBSET

This set of PunyInform debug verbs are not included by default, but can be added by defining DEBUG.

Verbs	Comment
actions	DEBUG
gonear	DEBUG
pronouns nouns	DEBUG
purloin	DEBUG
random	DEBUG
routines messages	DEBUG
scope	DEBUG
timers daemons	DEBUG
tree	DEBUG

These debug verbs defined in the library are not supported by PunyInform.

Verbs	Comment
abstract	not in PunyInform
changes	not in PunyInform
goto	not in PunyInform
showobj	not in PunyInform
showverb	not in PunyInform
trace	not in PunyInform

These are the meta verbs. Some are only included when OPTIONAL_EXTENDED_METAVERBS is defined, and some are not defined if NO_PLACES is defined.

Verbs	Comment
brief normal	
fullscore full	
noscript unscript	OPTIONAL_EXTENDED_METAVERBS

Verbs	Comment
notify	
objects	OPTIONAL_EXTENDED_METAVERBS and not NO_PLACES
places	OPTIONAL_EXTENDED_METAVERBS and not NO_PLACES
quit q die	
recording	OPTIONAL_EXTENDED_METAVERBS
replay	OPTIONAL_EXTENDED_METAVERBS
restart	
restore	
save	
score	
script transcript	OPTIONAL_EXTENDED_METAVERBS
superbrief short	
verify	OPTIONAL_EXTENDED_METAVERBS
verbose long	
version	